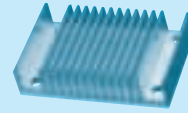




*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ A : DC60-160V
- ⑤ Output voltage

MODEL	DHS50A05	DHS50A12	DHS50A15	DHS50A24
MAX OUTPUT WATTAGE[W]	50.0	50.4	51.0	50.4
DC OUTPUT	5V 10A	12V 4.2A	15V 3.4A	24V 2.1A

SPECIFICATIONS

	MODEL	DHS50A05	DHS50A12	DHS50A15	DHS50A24	
INPUT	VOLTAGE[V]	DC60 - 160				
	CURRENT[A]	0.55A	0.55A	0.55A	0.55A	
	EFFICIENCY[%]	84.0typ	86.0typ	86.0typ	86.0typ	
OUTPUT	VOLTAGE[V]	5	12	15	24	
	CURRENT[A]	10	4.2	3.4	2.1	
	LINE REGULATION[mV]	10max	24max	30max	48max	
	LOAD REGULATION[mV]	10max	24max	30max	48max	
	RIPPLE[mVp-p]	0 to +100°C	80max	120max	120max	120max
		-40 to 0°C	120max	150max	150max	150max
		0 to 15% Load	160max	240max	240max	240max
	RIPPLE NOISE[mVp-p]	0 to +100°C	120max	150max	150max	150max
		-40 to 0°C	200max	200max	200max	250max
		0 to 15% Load	240max	300max	300max	300max
	TEMPERATURE REGULATION[mV]	0 to +65°C	50max	120max	150max	240max
		-40 to +100°C	100max	240max	300max	480max
	DRIFT[mV]	20max	40max	60max	90max	
START-UP TIME[ms]	200max (DCIN 110V, Io=100%)					
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	Fixed (TRM pin open), adjustable by external VR or external voltage					
OUTPUT VOLTAGE SETTING[V]	4.50 - 6.00	10.80 - 13.20	13.50 - 16.50	21.60 - 26.40		
	4.97 - 5.13	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38		
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically				
	OVERVOLTAGE PROTECTION[V]	6.30 - 7.60	13.90 - 17.55	17.25 - 21.75	27.60 - 34.80	
	REMOTE SENSING	nothing				
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H :OFF)				
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)				
ENVIRONMENT	OPERATING TEMP.,HUMID.AND ALTIITUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max				
	STORAGE TEMP.,HUMID.AND ALTIITUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max				
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL (CSA60950-1), EN60950-1				
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 37.3mm (W X H X D) / 60g max				
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)				

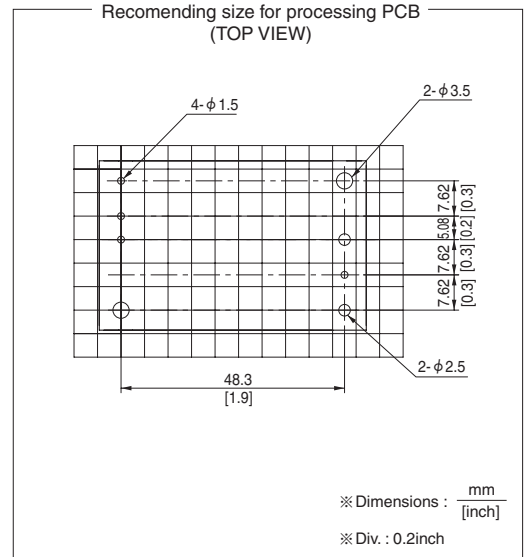
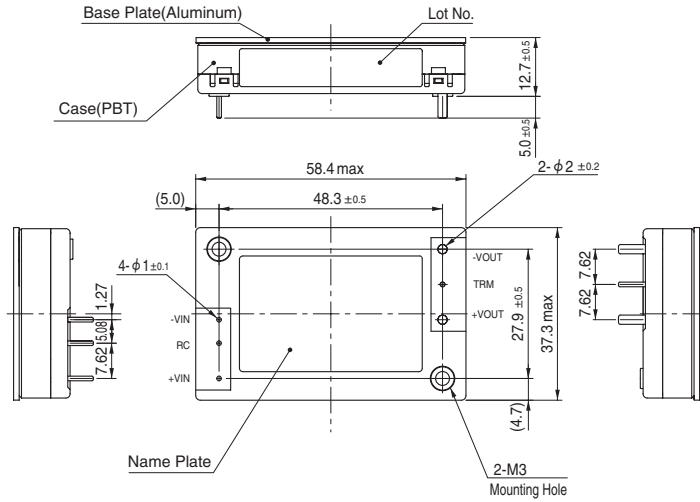
*1 At rated input(DC110V) and rated load.

*2 Ripple and ripple noise is measured by using measuring board. Refer to the manual

*3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.

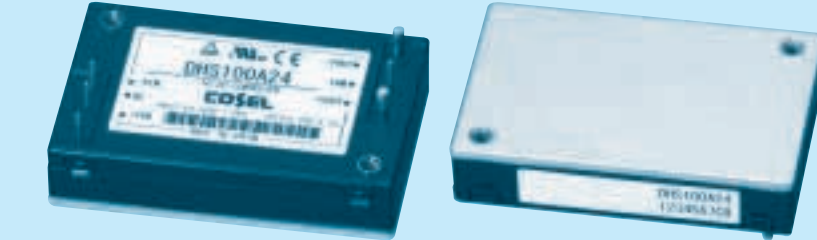
*4 Refer to the manual for input range.

External view

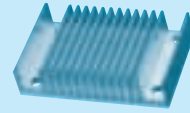


※ Dimensions : $\frac{\text{mm}}{\text{[inch]}}$
 ※ Div. : 0.2inch

- ※ Tolerance : ± 0.3
- ※ Weight : 60g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : $0.49\text{N} \cdot \text{m}$ (5.0kgf · cm) max



*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ A : DC60-160V
- ⑤ Output voltage

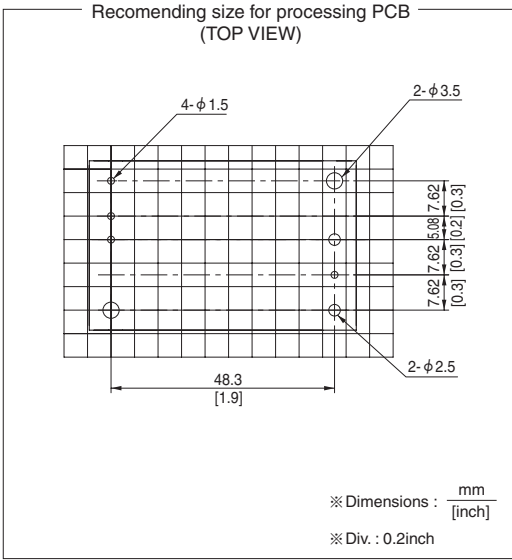
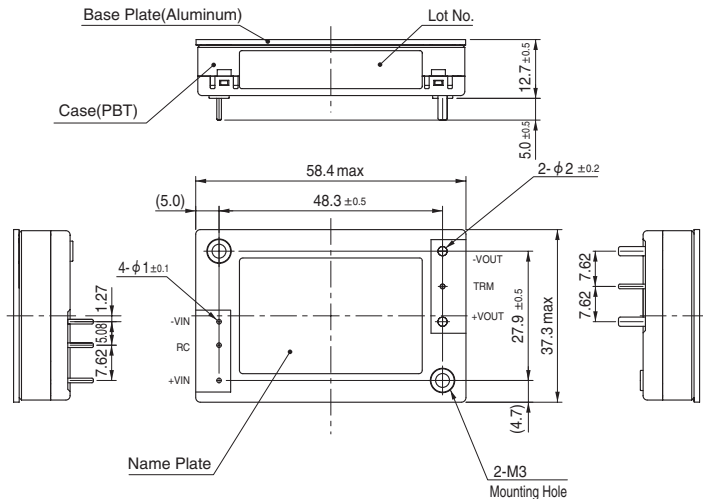
MODEL	DHS100A05	DHS100A12	DHS100A15	DHS100A24
MAX OUTPUT WATTAGE[W]	100.0	100.8	100.5	100.8
DC OUTPUT	5V 20A	12V 8.4A	15V 6.7A	24V 4.2A

SPECIFICATIONS

	MODEL	DHS100A05	DHS100A12	DHS100A15	DHS100A24	
INPUT	VOLTAGE[V]	DC60 - 160				
	CURRENT[A]	1.1A	1.1A	1.1A	1.1A	
	EFFICIENCY[%]	85.0typ	88.0typ	88.0typ	88.0typ	
OUTPUT	VOLTAGE[V]	5	12	15	24	
	CURRENT[A]	20	8.4	6.7	4.2	
	LINE REGULATION[mV]	10max	24max	30max	48max	
	LOAD REGULATION[mV]	10max	24max	30max	48max	
	RIPPLE[mVp-p]	0 to +100°C *2	80max	120max	120max	120max
		-40 to 0°C *2	120max	150max	150max	150max
		0 to 15% Load *2	160max	240max	240max	240max
	RIPPLE NOISE[mVp-p]	0 to +100°C *2	120max	150max	150max	150max
		-40 to 0°C *2	200max	200max	200max	250max
		0 to 15% Load *2	240max	300max	300max	300max
	TEMPERATURE REGULATION[mV]	0 to +65°C	50max	120max	150max	240max
		-40 to +100°C	100max	240max	300max	480max
	DRIFT[mV]	20max	40max	60max	90max	
START-UP TIME[ms]	200max (DCIN 110V, Io=100%)					
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	Fixed (TRM pin open), adjustable by external VR or external voltage					
OUTPUT VOLTAGE SETTING[V]	4.50 - 6.00	10.80 - 13.20	13.50 - 16.50	21.60 - 26.40		
	4.97 - 5.13	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38		
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically				
	OVERVOLTAGE PROTECTION[V]	6.30 - 7.60	13.90 - 17.55	17.25 - 21.75	27.60 - 34.80	
	REMOTE SENSING	nothing				
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H :OFF)				
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)				
ENVIRONMENT	OPERATING TEMP.,HUMID.AND ALTIUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max				
	STORAGE TEMP.,HUMID.AND ALTIUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max				
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL (CSA60950-1), EN60950-1				
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 37.3mm (W X H X D) / 60g max				
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)				

*1 At rated input(DC110V) and rated load.
 *2 Ripple and ripple noise is measured by using measuring board. Refer to the manual.
 *3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *4 Refer to the manual for input range.

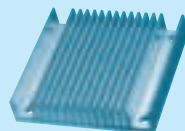
External view



- ※ Dimensions : $\frac{\text{mm}}{[\text{inch}]}$
- ※ Div. : 0.2inch
- ※ Tolerance : ± 0.3
- ※ Weight : 60g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : $0.49\text{N} \cdot \text{m}$ (5.0kgf · cm) max



*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ A : DC60-160V
- ⑤ Output voltage

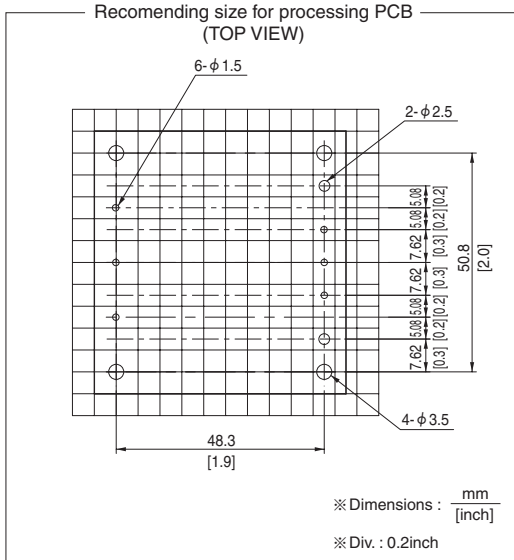
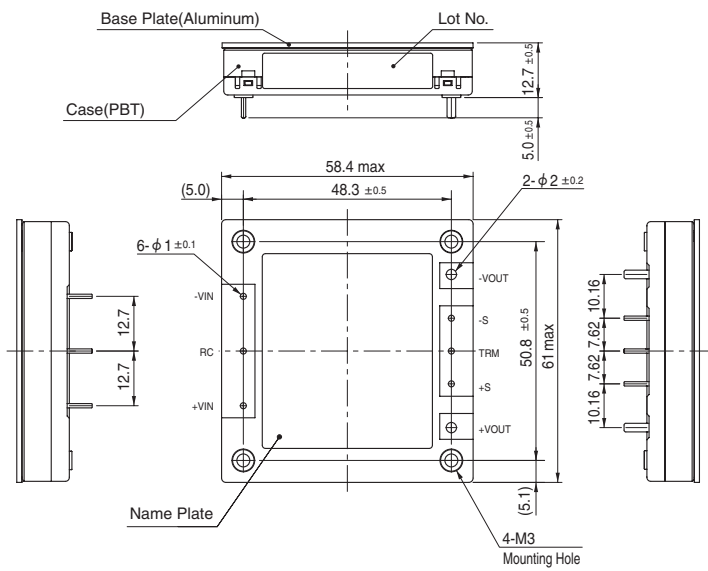
MODEL	DHS200A05	DHS200A12	DHS200A15	DHS200A24
MAX OUTPUT WATTAGE[W]	200.0	200.4	201.0	201.6
DC OUTPUT	5V 40A	12V 16.7A	15V 13.4A	24V 8.4A

SPECIFICATIONS

	MODEL	DHS200A05	DHS200A12	DHS200A15	DHS200A24	
INPUT	VOLTAGE[V]	DC60 - 160				
	CURRENT[A]	2.1A	2.1A	2.1A	2.1A	
	EFFICIENCY[%]	87.0typ	88.0typ	88.0typ	88.0typ	
OUTPUT	VOLTAGE[V]	5	12	15	24	
	CURRENT[A]	40	16.7	13.4	8.4	
	LINE REGULATION[mV]	10max	24max	30max	48max	
	LOAD REGULATION[mV]	10max	24max	30max	48max	
	RIPPLE[mVp-p]	0 to +100°C *2	80max	120max	120max	120max
		-40 to 0°C *2	120max	150max	150max	150max
		0 to 15% Load *2	160max	240max	240max	240max
	RIPPLE NOISE[mVp-p]	0 to +100°C *2	120max	150max	150max	150max
		-40 to 0°C *2	200max	200max	200max	250max
		0 to 15% Load *2	240max	300max	300max	300max
	TEMPERATURE REGULATION[mV]	0 to +65°C	50max	120max	150max	240max
		-40 to +100°C	100max	240max	300max	480max
	DRIFT[mV]	*3	20max	40max	60max	90max
START-UP TIME[ms]	200max (DCIN 110V, Io=100%)					
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	*4	Fixed (TRM pin open), adjustable by external VR or external voltage				
		3.00 - 6.00	7.20 - 13.20	9.00 - 16.50	14.40 - 26.40	
OUTPUT VOLTAGE SETTING[V]		4.97 - 5.13	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38	
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically				
	OVERVOLTAGE PROTECTION[V]	6.30 - 7.30	13.90 - 16.35	17.25 - 20.25	27.60 - 32.40	
	REMOTE SENSING	Provided				
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H :OFF)				
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)				
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)				
ENVIRONMENT	OPERATING TEMP.,HUMID.AND ALTIUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max				
	STORAGE TEMP.,HUMID.AND ALTIUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max				
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis Complies with IEC61373 Category 1 Class B				
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL (CSA60950-1), EN60950-1				
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 61mm (W X H X D) / 100g max				
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)				

*1 At rated input(DC110V) and rated load.
 *2 Ripple and ripple noise is measured by using measuring board. Refer to the manual.
 *3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *4 Refer to the manual for input range.

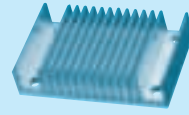
External view



- ※ Dimensions : mm [inch]
- ※ Div. : 0.2inch
- ※ Tolerance : ±0.3
- ※ Weight : 100g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : 0.49N · m (5.0kgf · cm) max



*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ B : DC200-400V
- ⑤ Output voltage

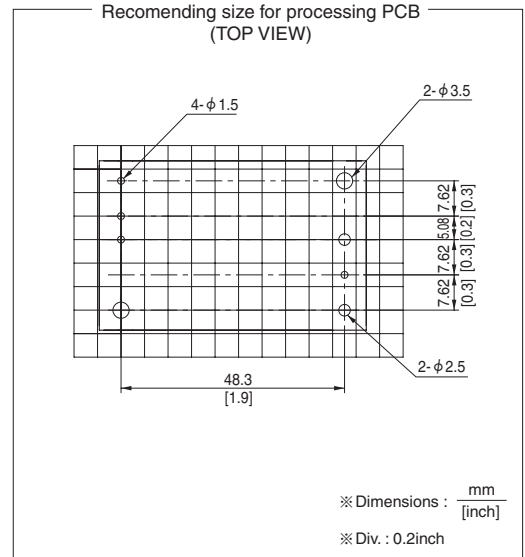
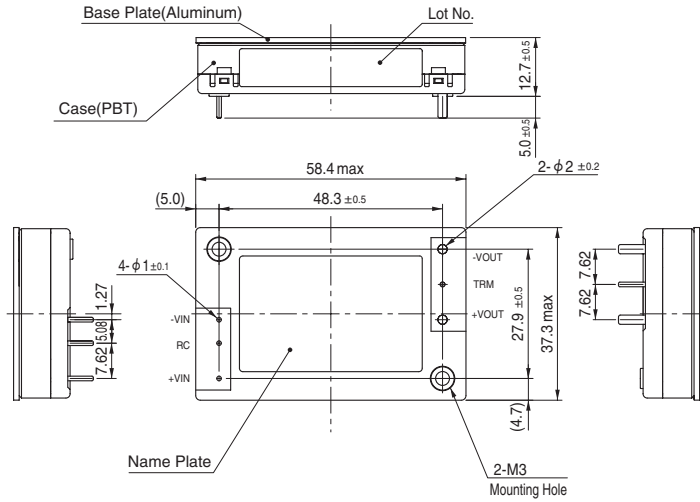
MODEL	DHS50B03	DHS50B05	DHS50B12	DHS50B15	DHS50B24	DHS50B28
MAX OUTPUT WATTAGE[W]	33.0	50.0	50.4	51.0	50.4	50.4
DC OUTPUT	3.3V 10A	5V 10A	12V 4.2A	15V 3.4A	24V 2.1A	28V 1.8A

SPECIFICATIONS

	MODEL	DHS50B03	DHS50B05	DHS50B12	DHS50B15	DHS50B24	DHS50B28	
INPUT	VOLTAGE[V]	DC200 - 400						
	CURRENT[A]	*1 0.15A	0.22A	0.22A	0.22A	0.22A	0.22A	
	EFFICIENCY[%]	*1 77.0typ	80.0typ	83.0typ	83.0typ	83.0typ	82.0typ	
OUTPUT	VOLTAGE[V]	3.3	5	12	15	24	28	
	CURRENT[A]	10	10	4.2	3.4	2.1	1.8	
	LINE REGULATION[mV]	10max	10max	24max	30max	48max	56max	
	LOAD REGULATION[mV]	10max	10max	24max	30max	48max	56max	
	RIPPLE[mVp-p]	0 to +100°C *2	80max	80max	120max	120max	120max	120max
		-40 to 0°C *2	120max	120max	150max	150max	150max	150max
		0 to 15% Load *2	160max	160max	240max	240max	240max	240max
	RIPPLE NOISE[mVp-p]	0 to +100°C *2	120max	120max	150max	150max	150max	150max
		-40 to 0°C *2	200max	200max	200max	200max	250max	250max
		0 to 15% Load *2	240max	240max	300max	300max	300max	300max
	TEMPERATURE REGULATION[mV]	0 to +65°C	35max	50max	120max	150max	240max	280max
		-40 to +100°C	66max	100max	240max	300max	480max	560max
	DRIFT[mV]	*3	16max	20max	40max	60max	90max	90max
	START-UP TIME[ms]	200max (DCIN 280V, Io=100%)						
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	*4	Fixed (TRM pin open), adjustable by external VR or external voltage						
OUTPUT VOLTAGE SETTING[V]		2.97 - 3.96	4.50 - 6.00	10.80 - 13.20	13.50 - 16.50	21.60 - 26.40	25.20 - 30.80	
		3.30 - 3.40	4.97 - 5.13	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38	27.56 - 28.44	
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically						
	OVERVOLTAGE PROTECTION[V]	4.20 - 5.70	6.30 - 7.60	13.90 - 17.55	17.25 - 21.75	27.60 - 34.80	32.20 - 40.60	
	REMOTE SENSING	None						
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H : OFF)						
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)						
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)						
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)						
ENVIRONMENT	OPERATING TEMP., HUMID. AND ALTITUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max						
	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max						
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis						
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis						
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL, EN60950-1						
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 37.3mm (W X H X D) / 60g max						
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)						

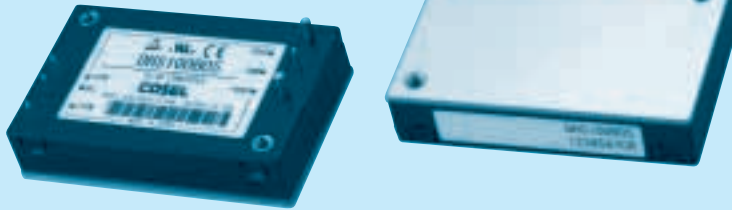
*1 At rated input(DC280V) and rated load.
 *2 Ripple and ripple noise is measured by using measuring board. Refer to the manual
 *3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *4 Refer to the manual for input range.

External view

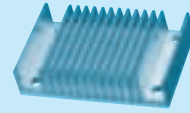


※ Dimensions : $\frac{\text{mm}}{[\text{inch}]}$
 ※ Div. : 0.2inch

- ※ Tolerance : ± 0.3
- ※ Weight : 60g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : $0.49\text{N} \cdot \text{m}$ (5.0kgf · cm) max



*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ B : DC200-400V
- ⑤ Output voltage

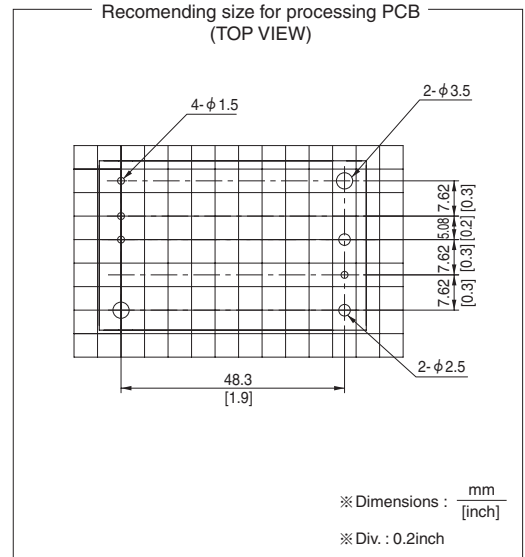
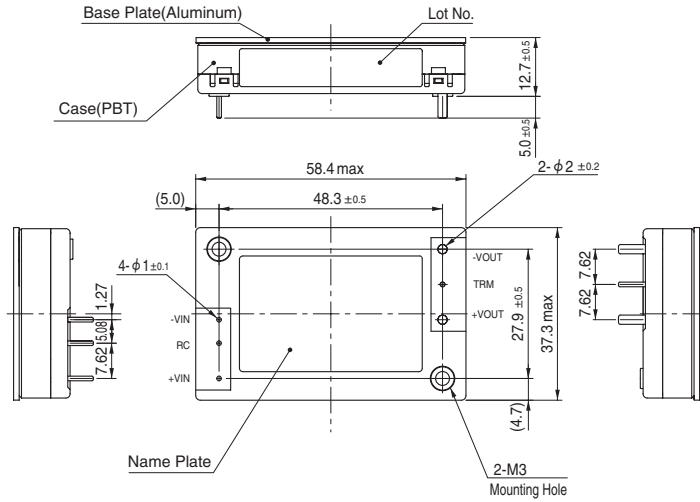
MODEL	DHS100B03	DHS100B05	DHS100B12	DHS100B15	DHS100B24	DHS100B28
MAX OUTPUT WATTAGE[W]	66.0	100.0	100.8	100.5	100.8	100.8
DC OUTPUT	3.3V 20A	5V 20A	12V 8.4A	15V 6.7A	24V 4.2A	28V 3.6A

SPECIFICATIONS

	MODEL	DHS100B03	DHS100B05	DHS100B12	DHS100B15	DHS100B24	DHS100B28	
INPUT	VOLTAGE[V]	DC200 - 400						
	CURRENT[A]	0.30A	0.44A	0.42A	0.42A	0.42A	0.42A	
	EFFICIENCY[%]	79.0typ	82.0typ	85.0typ	86.0typ	86.0typ	86.0typ	
OUTPUT	VOLTAGE[V]	3.3	5	12	15	24	28	
	CURRENT[A]	20	20	8.4	6.7	4.2	3.6	
	LINE REGULATION[mV]	10max	10max	24max	30max	48max	56max	
	LOAD REGULATION[mV]	10max	10max	24max	30max	48max	56max	
	RIPPLE[mVp-p]	0 to +100°C *2	80max	80max	120max	120max	120max	120max
		-40 to 0°C *2	120max	120max	150max	150max	150max	150max
		0 to 15% Load *2	160max	160max	240max	240max	240max	240max
	RIPPLE NOISE[mVp-p]	0 to +100°C *2	120max	120max	150max	150max	150max	150max
		-40 to 0°C *2	200max	200max	200max	200max	250max	250max
		0 to 15% Load *2	240max	240max	300max	300max	300max	300max
	TEMPERATURE REGULATION[mV]	0 to +65°C	35max	50max	120max	150max	240max	280max
		-40 to +100°C	66max	100max	240max	300max	480max	560max
	DRIFT[mV]	16max	20max	40max	60max	90max	90max	
START-UP TIME[ms]	200max (DCIN 280V, Io=100%)							
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	Fixed (TRM pin open), adjustable by external VR or external voltage							
	2.97 - 3.96	4.50 - 6.00	10.80 - 13.20	13.50 - 16.50	21.60 - 26.40	25.20 - 30.80		
OUTPUT VOLTAGE SETTING[V]	3.30 - 3.40	4.97 - 5.13	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38	27.56 - 28.44		
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically						
	OVERVOLTAGE PROTECTION[V]	4.20 - 5.70	6.30 - 7.60	13.90 - 17.55	17.25 - 21.75	27.60 - 34.80	32.20 - 40.60	
	REMOTE SENSING	None						
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H : OFF)						
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)						
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)						
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)						
ENVIRONMENT	OPERATING TEMP., HUMID. AND ALTITUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max						
	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max						
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis						
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis						
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL, EN60950-1						
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 37.3mm (W X H X D) / 60g max						
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)						

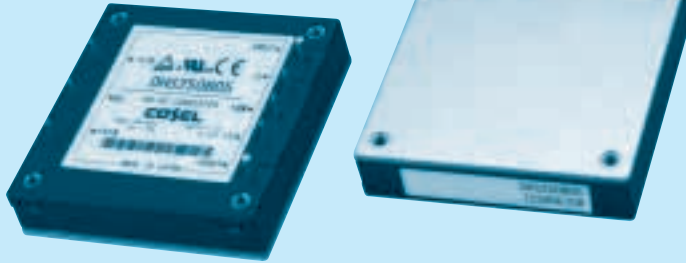
*1 At rated input(DC280V) and rated load.
 *2 Ripple and ripple noise is measured by using measuring board. Refer to the manual.
 *3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *4 Refer to the manual for input range.

External view

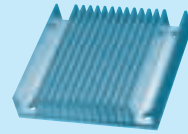


※ Dimensions : $\frac{\text{mm}}{\text{[inch]}}$
 ※ Div. : 0.2inch

- ※ Tolerance : ± 0.3
- ※ Weight : 60g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : $0.49\text{N} \cdot \text{m}$ (5.0kgf · cm) max



*Providing heat sink as option



- ① Series name
- ② Single output
- ③ Output wattage
- ④ B : DC200-400V
- ⑤ Output voltage

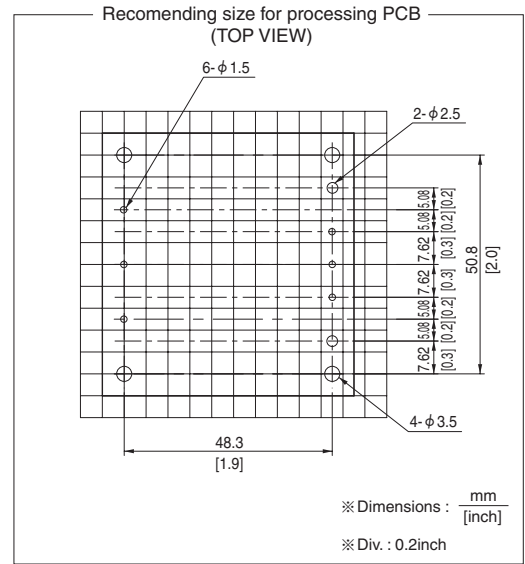
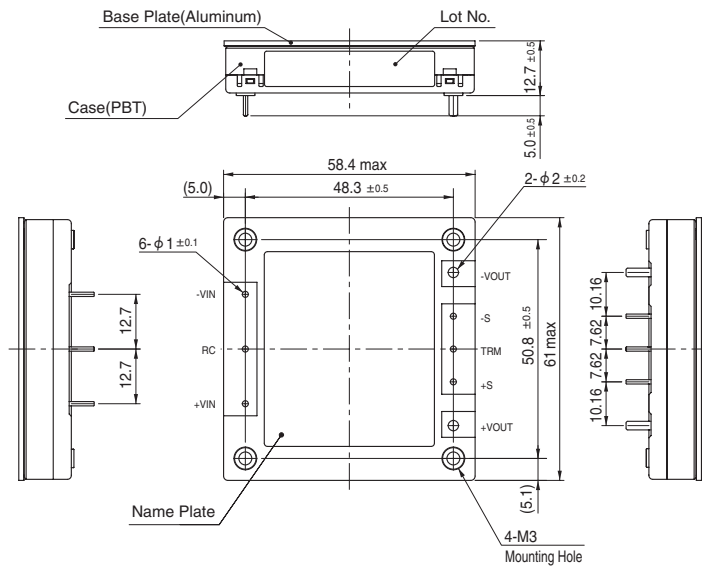
MODEL	DHS250B03	DHS250B05	DHS250B07	DHS250B12	DHS250B15	DHS250B24	DHS250B28	DHS250B48
MAX OUTPUT WATTAGE[W]	165.0	250.0	247.5	252.0	247.5	252.0	252.0	249.6
DC OUTPUT	3.3V 50A	5V 50A	7.5V 33A	12V 21A	15V 16.5A	24V 10.5A	28V 9.0A	48V 5.2A

SPECIFICATIONS

	MODEL	DHS250B03	DHS250B05	DHS250B07	DHS250B12	DHS250B15	DHS250B24	DHS250B28	DHS250B48	
INPUT	VOLTAGE[V]	DC200 - 400								
	CURRENT[A]	*1 0.67A	1.0A	1.0A	1.0A	1.0A	1.0A	1.0A	1.0A	
	EFFICIENCY[%]	*1 88.0typ	90.0typ	88.0typ	88.0typ	88.0typ	88.0typ	88.0typ	89.0typ	
OUTPUT	VOLTAGE[V]	3.3	5	7.5	12	15	24	28	48	
	CURRENT[A]	50	50	33	21	16.5	10.5	9.0	5.2	
	LINE REGULATION[mV]	10max	10max	20max	24max	30max	48max	56max	96max	
	LOAD REGULATION[mV]	10max	10max	20max	24max	30max	48max	56max	96max	
	RIPPLE[mVp-p]	0 to +100°C *2	80max	80max	100max	120max	120max	120max	120max	200max
		-40 to 0°C *2	120max	120max	130max	150max	150max	150max	150max	250max
		0 to 15% Load *2	160max	160max	200max	240max	240max	240max	240max	400max
	RIPPLE NOISE[mVp-p]	0 to +100°C *2	120max	120max	130max	150max	150max	150max	150max	250max
		-40 to 0°C *2	200max	200max	200max	200max	200max	250max	250max	400max
		0 to 15% Load *2	240max	240max	260max	300max	300max	300max	300max	500max
	TEMPERATURE REGULATION[mV]	0 to +65°C	35max	50max	70max	120max	150max	240max	280max	480max
		-40 to +100°C	66max	100max	140max	240max	300max	480max	560max	960max
	DRIFT[mV]	*3	16max	20max	30max	40max	60max	90max	90max	180max
START-UP TIME[ms]		200max (DCIN 280V, Io=100%)								
OUTPUT VOLTAGE ADJUSTMENT RANGE[V]	*4	Fixed (TRM pin open), adjustable by external VR or external voltage								
		1.98 - 3.96	3.00 - 6.00	4.50 - 8.25	7.20 - 13.20	9.00 - 16.50	14.40 - 26.40	16.80 - 30.80	28.80 - 52.80	
OUTPUT VOLTAGE SETTING[V]		3.30 - 3.40	4.97 - 5.13	7.43 - 7.67	11.91 - 12.29	14.76 - 15.24	23.62 - 24.38	27.56 - 28.44	47.24 - 48.76	
PROTECTION CIRCUIT AND OTHERS	OVERCURRENT PROTECTION	Works over 105% of rating and recovers automatically								
	OVERVOLTAGE PROTECTION[V]	4.20 - 4.85	6.30 - 7.30	8.70 - 10.20	13.90 - 16.35	17.25 - 20.25	27.60 - 32.40	32.20 - 37.80	55.20 - 64.80	
	REMOTE SENSING	Provided								
	REMOTE ON/OFF	Provided (Negative Logic L : ON, H :OFF)								
ISOLATION	INPUT-OUTPUT	AC3,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)								
	INPUT-FG	AC2,000V 1minute, Cutoff current = 10mA, DC500V 50MΩ min (20±15°C)								
	OUTPUT-FG	AC500V 1minute, Cutoff current = 100mA, DC500V 50MΩ min (20±15°C)								
ENVIRONMENT	OPERATING TEMP., HUMID. AND ALTITUDE	-40 to +100°C (On aluminum base plate), 20 - 95%RH (Non condensing) (Refer to DERATING CURVE), 3,000m (10,000 feet) max								
	STORAGE TEMP., HUMID. AND ALTITUDE	-40 to +100°C, 20 - 95%RH (Non condensing), 9,000m (30,000 feet) max								
	VIBRATION	10 - 55Hz, 49.0m/s ² (5G), 3minutes period, 60minutes each along X, Y and Z axis								
	IMPACT	196.1m/s ² (20G), 11ms, once each along X, Y and Z axis								
SAFETY	AGENCY APPROVALS	UL60950-1, C-UL, EN60950-1								
OTHERS	CASE SIZE/WEIGHT	58.4 X 12.7 X 61mm (W X H X D) / 100g max								
	COOLING METHOD	Conduction cooling (e.g. heat radiation from the aluminum base plate to the attached heat sink)								

*1 At rated input(DC280V) and rated load.
 *2 Ripple and ripple noise is measured by using measuring board. Refer to the manual.
 *3 Drift is the change in DC output for an eight hour period after a half-hour warm-up at 25°C, with the input voltage held constant at the rated input/output.
 *4 Refer to the manual for input range.

External view



- ※ Dimensions : $\frac{\text{mm}}{\text{[inch]}}$
- ※ Div. : 0.2inch
- ※ Tolerance : ± 0.3
- ※ Weight : 100g or less
- ※ Dimensions in mm.
- ※ Mounting hole screwing torque : $0.49\text{N} \cdot \text{m}$ (5.0kgf · cm) max

Basic Characteristics Data

Model	Circuit method	Switching frequency [kHz]	Input current [A]	Rated input fuse	PCB/Pattern			Series/Parallel operation availability	
					Material	Single sided	Double sided	Series operation	Parallel operation
DHS50A DHS50B	Forward converter	470	*1	-	Aluminum	Yes		Yes	*2
DHS100A DHS100B	Forward converter	470	*1	-	Aluminum	Yes		Yes	*2
DHS200A DHS250B	Forward converter	360	*1	-	Aluminum	Yes		Yes	*2

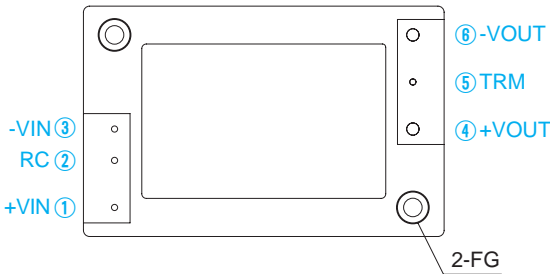
*1 Refer to Specification.

*2 Refer to Instruction Manual.

1	Pin Connection	H-70
2	Connection for Standard Use	H-70
3	Wiring Input/Output Pin	H-70
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1 Pin Connection

●DHS50/100



●DHS200/250

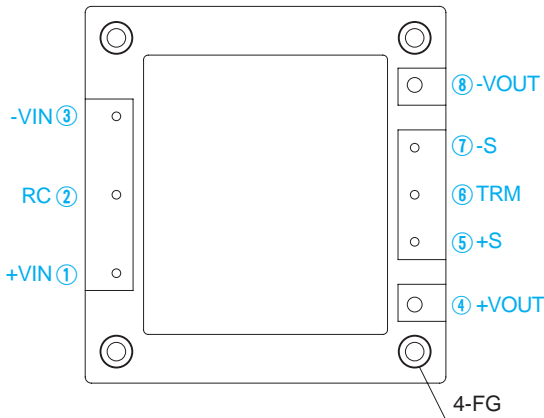


Fig.1.1 Pin Connection (bottom view)

Table 1.1 Pin Connection and function

No.	Pin Connection	Function
DHS50/100	DHS200/250	
①	① +VIN	+DC input
②	② RC	Remote ON/OFF
③	③ -VIN	-DC input
④	④ +VOUT	+DC output
—	⑤ +S	+Remote sensing
⑤	⑥ TRM	Adjustment of output voltage
—	⑦ -S	-Remote sensing
⑥	⑧ -VOUT	-DC output
—	— Mounting hole	Mounting hole

No.	Pin Connection	Reference
DHS50/100	DHS200/250	
①	① +VIN	3.1 Wiring input pin
②	② RC	4.4 Remote ON/OFF
③	③ -VIN	3.1 Wiring input pin
④	④ +VOUT	3.2 Wiring output pin
—	⑤ +S	4.5 Remote sensing
⑤	⑥ TRM	4.6 Adjustable voltage range
—	⑦ -S	4.5 Remote sensing
⑥	⑧ -VOUT	3.2 Wiring output pin
—	— Mounting hole	6.1 "Mounting hole"

2 Connection for Standard Use

■ In order to use the power supply, it is necessary to wire as shown in Fig.2.1 and external components in table2.1.

■ Short the following pins to turn on the power module.

-VIN↔RC, +VOUT↔+S, and -VOUT↔S (DHS200/250)

- Reference: 4.4 "Remote ON/OFF"
- 4.5 "Remote sensing"

■ The DHS Series handles only the DC input.

Avoid applying AC input directly.

It will damage the power supply.

■ Operate with the conduction cooling(e.g. heat radiation from the aluminum base plate to the attached heat sink).

- Reference: 6.5 "Derating"

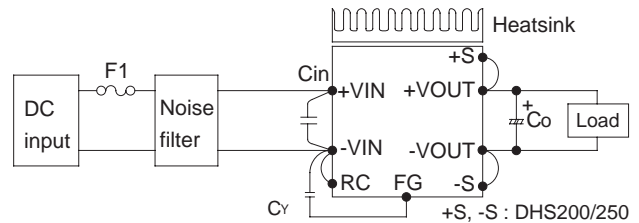


Fig.2.1 Connection for Standard Use

Table 2.1 External components

No.	Symbol	component	Reference
1	F1	Input fuse	3.1 (1) "External fuse"
2	Cy	Primary decoupling capacitor	3.1 (2) "Noise filter/Decoupling capacitor"
3	-	Noise filter	
4	Cin	External capacitor on the input side	3.1 (3) "External capacitor on the input side"
5	Co	External capacitor on the output side	3.2 "Wiring output pin"
6	-	Heatsink	6.5 "Derating"

3 Wiring Input/Output Pin

3.1 Wiring input pin

(1) External fuse

■ Fuse is not built-in on input side. In order to protect the unit, install the normal blow type fuse on input side.

■ When the input voltage from a front end unit is supplied to multiple units, install the normal blow type fuse in each unit.

Table 3.1 Recommended fuses (Normal-blow type)

Model	DHS50A/DHS100A	DHS200A
Rated current	3.15A	5A
Model	DHS50B/DHS100B	DHS250B
Rated current	1.6A	3.15A

(2) Noise filter/Decoupling capacitor

- Install an external noise filter and a decoupling capacitor C_V for low line-noise and for stable operation of the power supply.
- Install a correspondence filter, if a noise standard meeting is required or if the surge voltage may be applied to the unit.
- Install a primary decoupling capacitor C_V , with more than 470pF, near the input pins(within 50mm from the pins).
- When the total capacitance of the primary decoupling capacitor is more than 8800pF, the nominal value in the specification may not be met by the Hi-Pot test between input and output. In this case, it is that a capacitor should be installed between output and FG.

(3) External capacitor on the Input side.

- Install an external capacitor C_{in} between +VIN and -VIN input pins for low line-noise and for stable operation of the power supply.

DHS50A/100A	: more than 22 μ F *
DHS200A	: more than 47 μ F *
DHS50B/100B/250B	: more than 0.1 μ F

*When the line inductance is high or ambient temperature is lower than -20°C, please increase C_{in} value more than the value indicated above.

- When the line impedance is high or the input voltage rise quickly at start-up(less than 10 μ s), install a capacitor C_{in} between +VIN and -VIN input pins(within 50mm from pins).

DHS50B/100B	: more than 10 μ F
DHS250B	: more than 22 μ F

(4) Input voltage range/Input current range

- The specification of input ripple voltage is shown as below.

Ripple voltage	DHS50A/100A/200A	: less than 10Vp-p
	DHS50B/100B/250B	: less than 20Vp-p

- Make sure that the voltage fluctuation, including the ripple voltage, will not exceed the input voltage range.

- Use a front end unit with enough power, considering the start-up current I_p of this unit.

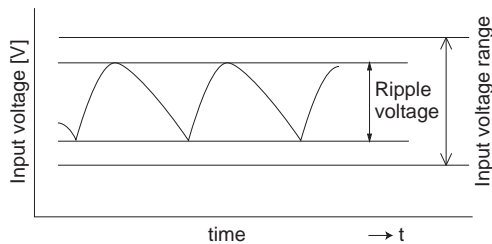


Fig.3.1 Input voltage ripple

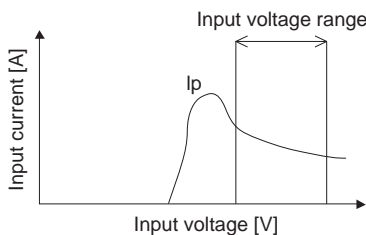


Fig.3.2 Input current characteristics

(5) Operation with AC input

- The DHS series handles only for the DC input.

A front end unit(AC/DC unit) is required when the DHS series is operated with AC input.

(6) Reverse input voltage protection

- Avoid the reverse polarity input voltage. It will break the power supply.

It is possible to protect the unit from the reverse input voltage by installing an external diode.

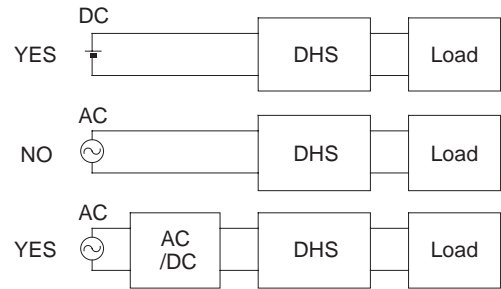


Fig.3.3 Use with AC input

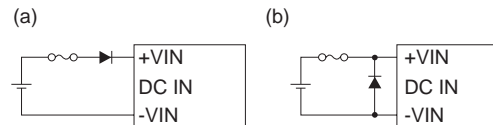


Fig.3.4 Reverse input voltage protection

3.2 Wiring output pin

- Install an external capacitor C_o between +VOUT and -VOUT pins for stable operation of the power supply.

Recommended capacitance of C_o is shown in Table 3.2.

- Select the high frequency type capacitor. Output ripple and start-up waveform may be influenced by ESR ESL of the capacitor and the wiring impedance.

- Install a capacitor C_o near the output pins(within 50mm from the pins).

Table 3.2 Recommended capacitance C_o [μ F]

Model	Temperature of Base plate			
	Tbp=0~+100 °C		Tbp=-40~+100 °C	
	DHS50/100	DHS200/250	DHS50/100	DHS200/250
Output voltage (V)				
3.3	2200	2200	2200 X 3	2200 X 3
5	2200	2200	2200 X 3	2200 X 3
7.5	-	2200	-	2200 X 3
12	470	1000	470 X 3	1000 X 3
15	470	1000	470 X 3	1000 X 3
24	220	470	220 X 3	470 X 3
28	220	470	220 X 3	470 X 3
48	-	330	-	330 X 3

- The specified ripple and ripple noise are measured by the method introduced in Fig. 3.5.

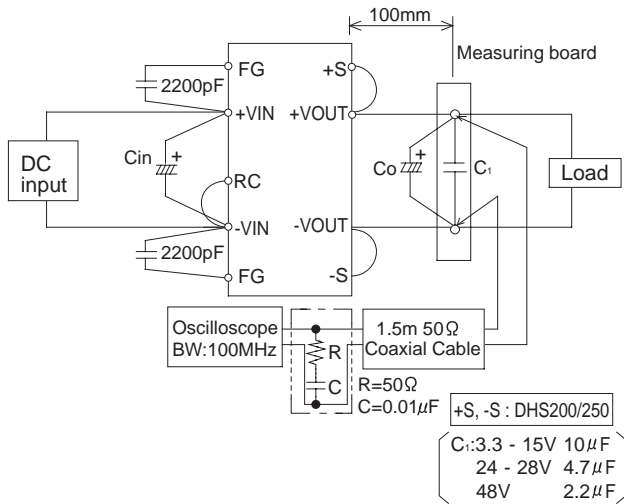


Fig.3.5 Method of Measuring Output Ripple and Ripple Noise

4 Function

4.1 Overcurrent protection

Over Current Protection (OCP) is built in and works at 105% of the rated current or higher. However, use in an over current situation must be avoided whenever possible. The output voltage of the power module will recover automatically if the fault causing over current is corrected.

When the output voltage drops after OCP works, the power module enters a "hiccup mode" where it repeatedly turns on and off at a certain frequency.

4.2 Overvoltage protection

Over Voltage Protection (OVP) is built in. When OVP works, output voltage can be recovered by shutting down DC input for at least one second or by turning off the remote control switch for one second without shutting down the DC input. The recovery time varies according to input voltage and input capacitance.

Remarks:

Note that devices inside the power module may fail when a voltage greater than the rated output voltage is applied from an external power supply to the output terminal of the power module. This could happen in in-coming inspections that include OVP function test or when voltage is applied from the load circuit. OVP can be tested by using the TRM terminal. Consult us for details.

4.3 Thermal protection

Over Temperature Protection (OTP) is built in. If the base plate temperature exceeds 100°C, OTP will work, causing the output voltage to drop. Output voltage can be recovered by shutting down DC input for at least one second or by turning RC off for one second without shutting down the DC input.

4.4 Remote ON/OFF

The remote ON/OFF function is incorporated in the input circuit and operated with RC and -VIN.

Table 4.1 Remote ON/OFF Specifications

ON/OFF logic	Between RC and -VIN	Output voltage
Negative	L level(0 - 1.2V) or short	ON
	H level(3.5 - 7.0V) or open	OFF

When RC is at low level, a current of 0.5mA typ will flow out.

When Vcc is used, keep it within the following rage:

$$3.5 \leq VCC \leq 7V.$$

When remote ON/OFF is not used, short RC and -VIN.

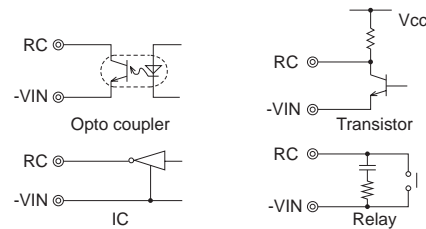


Fig. 4.1 RC Connection Example

●DHS200, DHS250

4.5 Remote sensing

(1) When Remote Sensing is Not Used

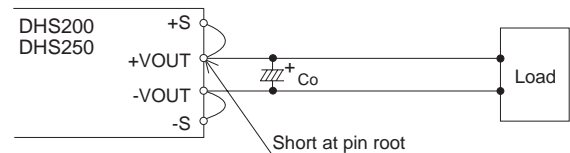


Fig. 4.2 When Remote Sensing is Not Used (DHS200/250)

When remote sensing is not used, make sure +VOUT and +S are shorted, and that -VOUT and -S are shorted as well.

Keep the patterns between +S and +VOUT and between -S and -VOUT as short as possible. Avoid a looping pattern. If noise enters the loop, the operation of the power module will become unstable.

(2) When Remote Sensing is Used

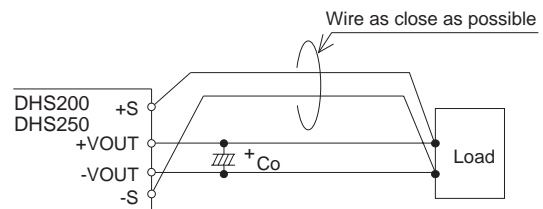


Fig. 4.3 When Remote Sensing is Used (DHS200/250)

Using remote sensing with long wires may cause output voltage to become unstable. Consult us if long sensing wiring is necessary.

Sensing patterns or wires should be as short as possible. If wires are used, use either twisted-pair or shielded wires.

- Use wide PCB patterns or thick wires between the power module and the load. Line drop should be kept less than 0.3V. Make sure output voltage from the power module stays within the specified range.
 - If the sensing patterns are shorted by mistake, a large current may flow and damage the pattern. This can be prevented by installing fuses or resistors close to the load.
- As wiring or load impedance may generate oscillation or large fluctuations in output voltage, make sure enough evaluation is given in advance.

4.6 Adjustable voltage range

- Output voltage between +VOUT and -VOUT can be adjusted by connecting external resistors to TRM.
 - When the output voltage adjustment is not used, open the TRM pin respectively.
 - When the output voltage adjustment is used, note that the over-voltage protection circuit operates when the output voltage sets too high.
 - The wiring to the potentiometer should be as short as possible.
- As the ambient temperature fluctuation characteristics deteriorates depending on the types of resistors and potentiometers used, please use resistors and potentiometers of the following specifications:
- Resistors..... Metal film type, coefficient less than $\pm 100\text{ppm}/^\circ\text{C}$
 Potentiometers ... Cermet type, coefficient less than $\pm 300\text{ppm}/^\circ\text{C}$
- When the input voltage is 60 - 66VDC or 200 - 250VDC, the output voltage adjustment range becomes as shown in fig . 4.4.

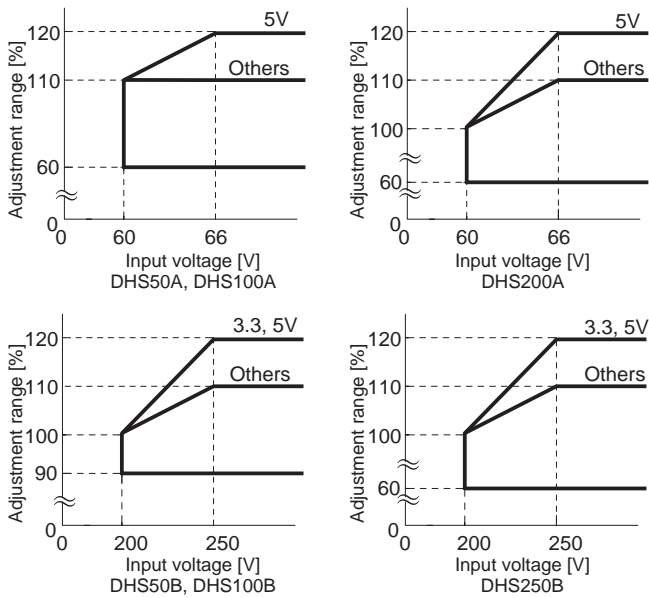


Fig. 4.4 Output Voltage Adjustment Range

● DHS50, DHS100

- To increase the output voltage, turn the potentiometer clockwise and connect in such a way that the resistance value between ② and ③ becomes small.
- To decrease the output voltage, turn the potentiometer counter-clockwise.

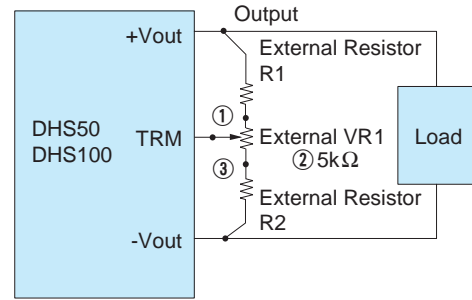


Fig. 4.5 Connecting External Devices (DHS50, DHS100)

Table 4.2 Recommended Values of External Resistors (DHS50, DHS100)

No.	Output Voltage	Adjustable Range			
		VOUT $\pm 5\%$		VOUT $\pm 10\%$	
		R1	R2	R1	R2
1	3.3V	5.1k Ω	3.3k Ω	3.3k Ω	2.2k Ω
2	5V	12k Ω		8.2k Ω	
3	12V	15k Ω		10k Ω	
4	15V	22k Ω		15k Ω	
5	24V	39k Ω		27k Ω	
6	28V	47k Ω		33k Ω	

● DHS200, DHS250

(1) Output voltage adjusting

- Output voltage can be adjusted by connecting an external potentiometer (VR1) and resistors (R1 and R2) as shown in Fig. 4.6. Output voltage will increase if the resistance between ① and ② is reduced by turning the potentiometer clockwise.
- Recommended values for external components are shown in Table 4.3.
- Consult us if the power module is used in a different configuration.

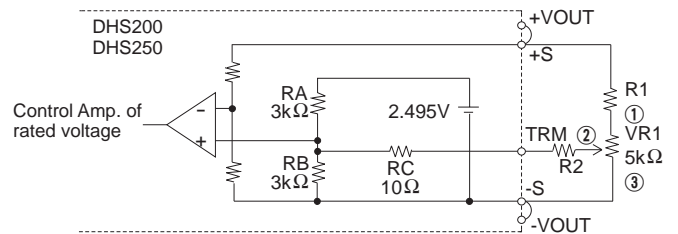


Fig. 4.6 Connecting External Parts (DHS250)

Table 4.3 Recommended Values of External Resistors (DHS250)

No.	Output Voltage	Adjustable Range			
		VOUT $\pm 5\%$		VOUT $\pm 10\%$	
		R1	R2	R1	R2
1	3.3V	2.4k Ω	12k Ω	2.4k Ω	8.2k Ω
2	5V	5.6k Ω		5.6k Ω	
3	7.5V	10k Ω		10k Ω	
4	12V	18k Ω		18k Ω	
5	15V	24k Ω		24k Ω	
6	24V	43k Ω		43k Ω	
7	28V	47k Ω		47k Ω	
8	48V	91k Ω		91k Ω	

(2) Output voltage decreasing

■By connecting the external resistor (RD), output voltage becomes adjustable to decrease.

The external resistor (RD) is calculated the following equation.

$$RD = \frac{1.51 \times \frac{V_{OD}}{V_{OR}} - 0.01}{1.0 - \frac{V_{OD}}{V_{OR}}} \text{ [k}\Omega\text{]}$$

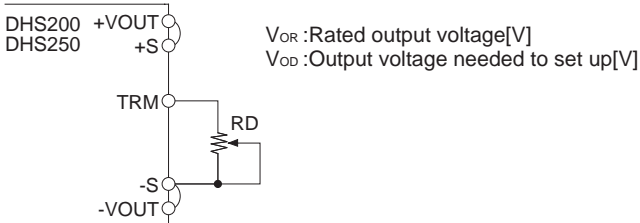


Fig. 4.7 Connection for output voltage decreasing (DHS200/250)

(3) Output voltage increasing

■By connecting the external resistor (RU), output voltage becomes adjustable to increase.

The external resistor (RU) is calculated the following equation.

$$RU = \frac{\left[3.0 \times \frac{V_{OR}}{V_{ref}} - 1.51 \right] \times \frac{V_{OU}}{V_{OR}} + 0.01}{\frac{V_{OU}}{V_{OR}} - 1.0}$$

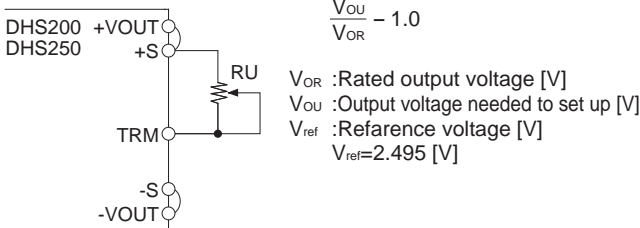


Fig. 4.8 Connection for output voltage increasing (DHS200/250)

4.7 Withstanding Voltage / Isolation Voltage

■When testing the withstanding voltage, make sure the voltage is increased gradually. When turning off, reduce the voltage gradually by using the dial of the hi-pot tester. Do not use a voltage tester with a timer as it may generate voltage several times as large as the applied voltage.

5 Series and Parallel Operation

5.1 Series operation

■Series operation is available by connecting the outputs of two or more power supplies, as shown below. Output current in series connection should be lower than the lowest rated current in each unit.

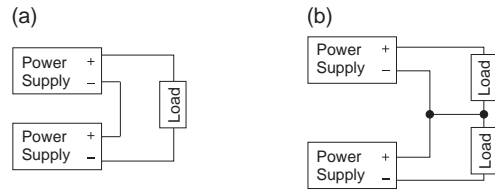


Fig. 5.1 Examples of series operation

5.2 Redundancy operation

■Parallel operation is not possible.
 ■Redundancy operation is available by wiring as shown below.

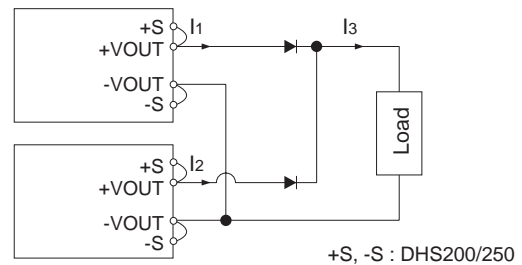


Fig. 5.2 Example of Redundancy Operation

■Even a slight difference in output voltage can affect the balance between the values of I_1 and I_2 . Please make sure that the value of I_3 does not exceed the rated current of a power supply.

$$I_3 \leq \text{the rated current value}$$

6 Implementation · Mounting Method

6.1 Mounting method

■The unit can be mounted in any direction. When two or more power supplies are used side by side, position them with proper intervals to allow enough air ventilation. Aluminum base plate temperature around each power supply should not exceed the temperature range shown in derating curve.

■Avoid placing the DC input line pattern lay out underneath the unit, it will increase the line conducted noise. Make sure to leave an ample distance between the line pattern lay out and the unit. Also avoid placing the DC output line pattern underneath the unit because it may increase the output noise. Lay out the pattern away from the unit.

■High-frequency noise radiates directly from the unit to the atmosphere. Therefore, design the shield pattern on the printed circuit board and connect its one to FG.

The shield pattern prevents noise radiation.

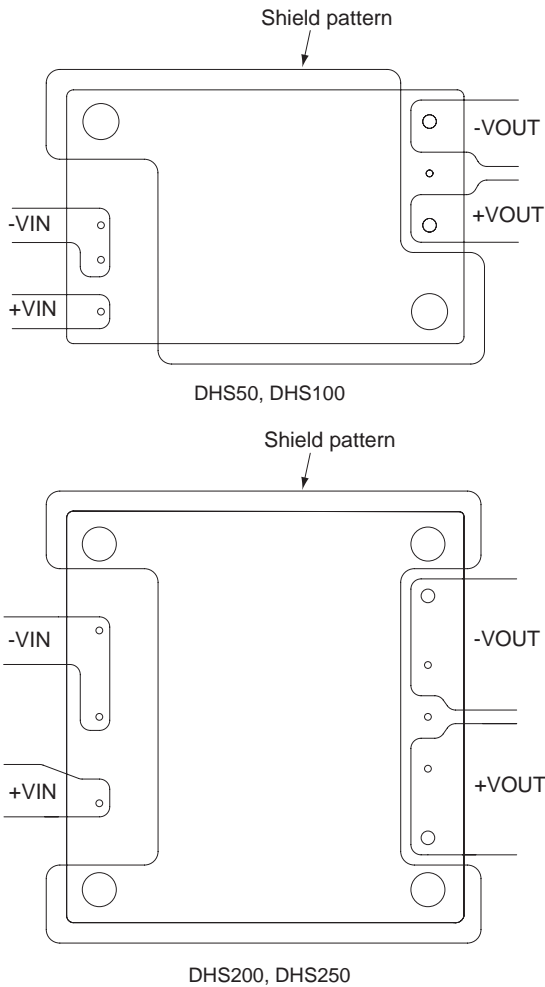


Fig. 6.1 Shield pattern lay out (bottom view)

6.2 Stress onto the pins

- Applying excessive stress to the input or output pins of the power module may damage internal connections. Avoid applying stress in excess of that shown in Fig. 6.1.
- Input and output pins are soldered onto the internal PCB. Do not bend or pull the leads with excessive force.
- As unexpected stress may be applied to the pins, set the diameter of the PCB mounting hole at 3.5mm.
- As unexpected stress may be applied to the pins from vibration or shock, fix the power module by using the mounting holes with screws to reduce stress.
- Fix the power module to the PCB with the screws before soldering the input and output pins to prevent the PCB pattern being damaged.

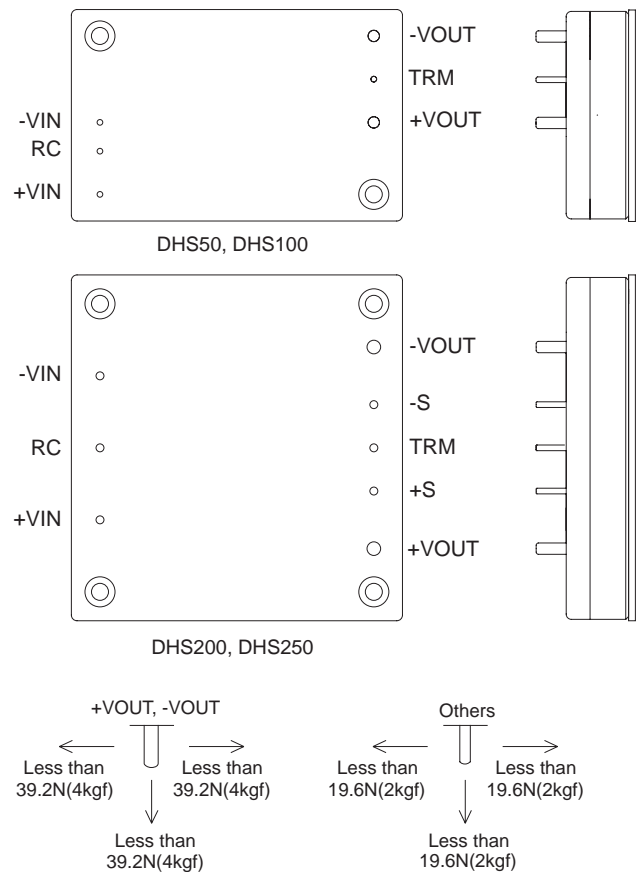


Fig. 6.2 Stress onto Pins

6.3 Cleaning

- Clean the soldered side of the power module with a brush. Prevent liquid from getting into the power module. Do not clean by soaking the power module into liquid.
- Do not allow solvent to come in contact with product labels or resin cases as this may change the color of the resin case or cause deletion of the letters printed on the product label.
- After cleaning, dry the power modules well.

6.4 Soldering temperature

- Flow soldering: 260°C for up to 15 seconds.
- Soldering iron (26W): 450°C for up to 5 seconds.

6.5 Derating

- Use the power modules with conduction cooling (e.g. heat dissipation from the aluminum base plate to the attached heat sink). Fig. 6.3 shows the derating curves with respect to the aluminum base plate temperature. Note that operation within the hatched areas will cause a significant level of ripple and ripple noise.
- Please measure the temperature on the aluminum base plate edge side when you cannot measure the temperature of the center part of the aluminum base plate. In this case, please take 5deg temperature margin from the derating characteristic of Figure 6.3.

It is necessary to note the thermal fatigue life by power cycle. Please reduce the temperature fluctuation range as much as possible when the up and down of the temperature are frequently generated. Contact us for more information on cooling methods.

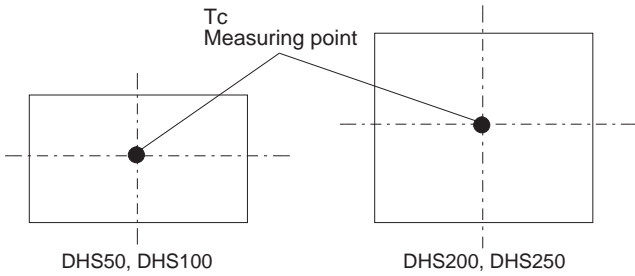
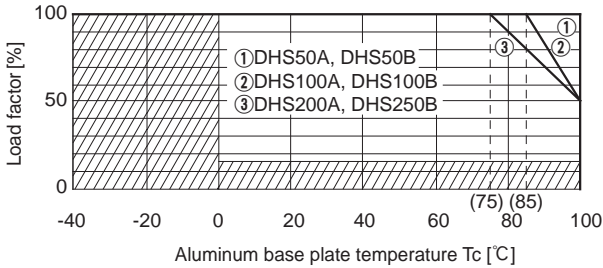


Fig.6.3 Derating Curve

6.6 Heat sink(Optional parts)

●DHS50, DHS100

The power module works with conduction cooling and needs heat dissipation using heat sinks. Optional heat sinks are available for DHS Series. Refer to Table 6.1 and Table 6.2 for details on the thermal resistance of heat sinks.

Table 6.1 Types of Heat Sinks Available

No.	Model	Size[mm]			Thermal resistance[°C/W]		Style
		H	W	D	Convection (0.1m/s)	Forced Air	
1	F-QB-F1	12.7	58.4	37.6	14.0	Refer Fig.6.5	Horizontal
2	F-QB-F2	12.7	58.7	37.3			Vertical
3	F-QB-F3	25.4	58.4	37.6	7.5		Horizontal
4	F-QB-F4	25.4	58.7	37.3			Vertical
5	F-QB-F5	38.1	58.4	37.6	5.0		Horizontal
6	F-QB-F6	38.1	58.7	37.3			Vertical

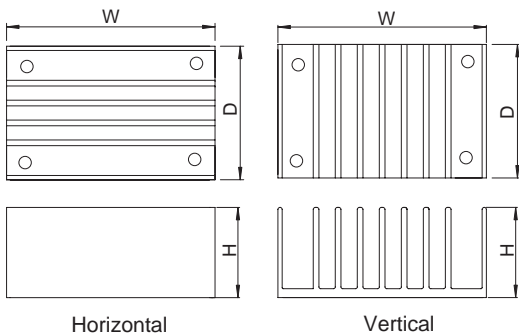


Fig.6.4 Heat Sink Types

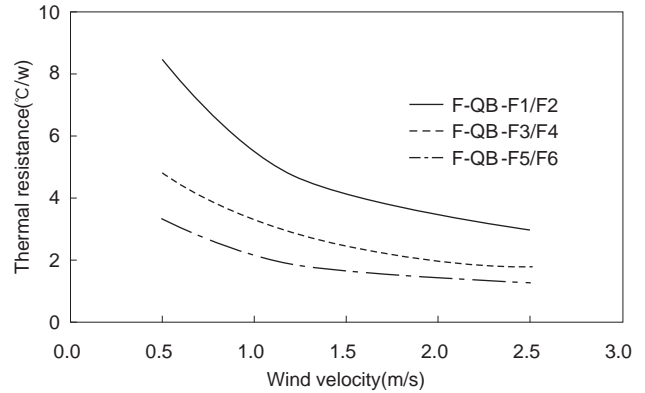


Fig.6.5 Thermal Resistance of Heat Sink(Forced Air)

●DHS200, DHS250

Table 6.2 Types of Heat Sinks Available

No.	Model	Size[mm]			Thermal resistance[°C/W]		Style
		H	W	D	Convection (0.1m/s)	Forced Air	
1	F-CBS-F1	12.7	57.9	61.5	7.5	Refer Fig.6.7	Horizontal
2	F-CBS-F2	12.7	58.4	61.0			Vertical
3	F-CBS-F3	25.4	57.9	61.5	4.6		Horizontal
4	F-CBS-F4	25.4	58.4	61.0			Vertical
5	F-CBS-F5	38.1	57.9	61.5	3.0		Horizontal
6	F-CBS-F6	38.1	58.4	61.0			Vertical

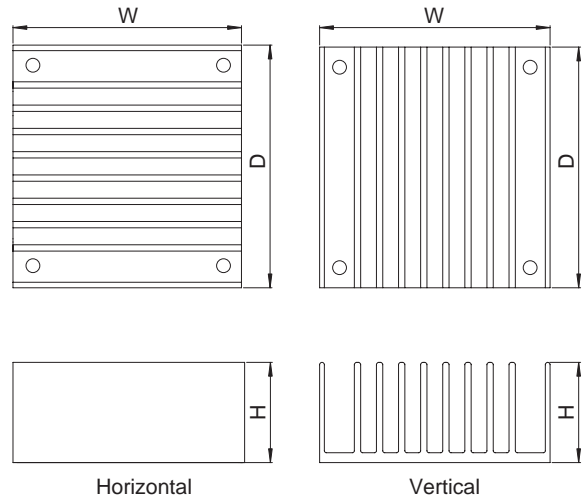


Fig. 6.6 Heat Sink Types

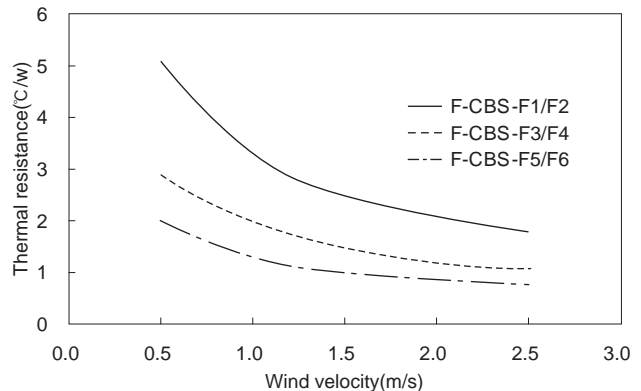


Fig.6.7 Thermal Resistance of Heat Sink(Forced Air)

Heat sink

Heat sink is prepared in CQHS series and DHS50, DHS100 series.

Chart: List of Heat sink for DHS50, DHS100 series

No	Model	Size [mm]			Thermal resistance [°C/W]		Style
		H	W	D	Convection (0.1m/s)	Forced Air	
1	F-QB-F1	12.7	58.4	37.6	14.0	Refer Fig.7	Horizontal
2	F-QB-F2	12.7	58.7	37.3			Vertical
3	F-QB-F3	25.4	58.4	37.6	7.5		Horizontal
4	F-QB-F4	25.4	58.7	37.3			Vertical
5	F-QB-F5	38.1	58.4	37.6	5.0		Horizontal
6	F-QB-F6	38.1	58.7	37.3			Vertical

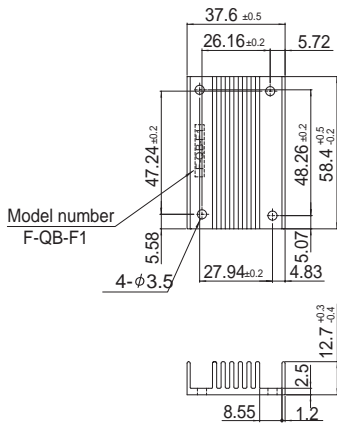


Fig.1 F-QB-F1 external view

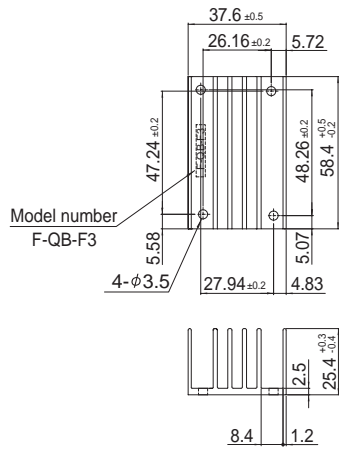


Fig.2 F-QB-F3 external view

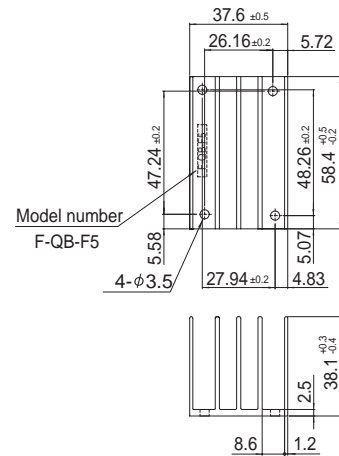


Fig.3 F-QB-F5 external view

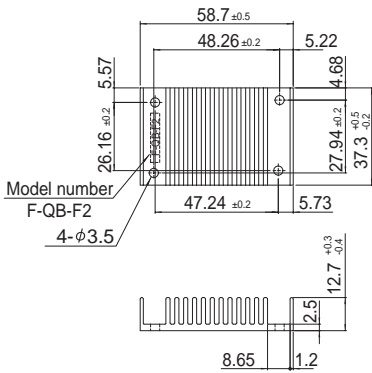


Fig.4 F-QB-F2 external view

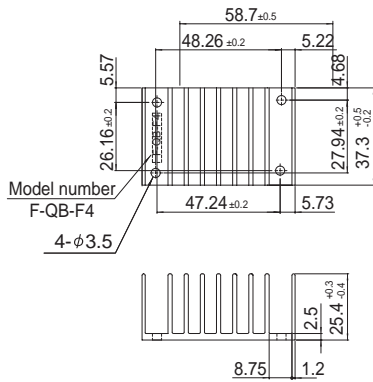


Fig.5 F-QB-F4 external view

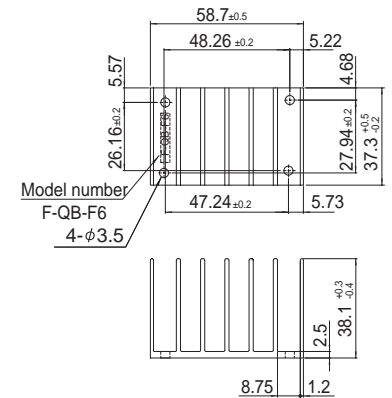


Fig.6 F-QB-F6 external view

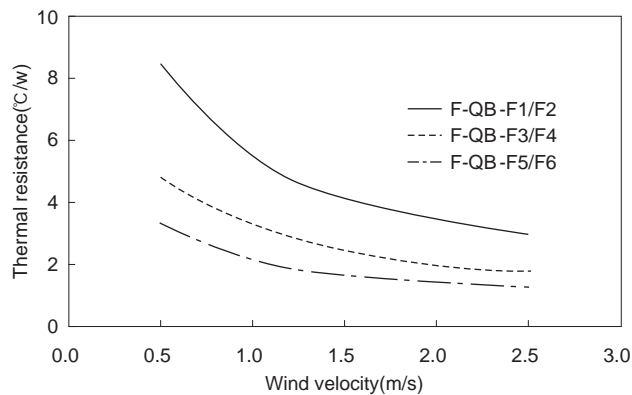


Fig.7 Thermal resistance of heat sink(Forced air)

Heat sink

Heat sink is prepared in CBS series, DHS200 series and DHS250 series.

Chart: List of Heat sink for CBS series, DHS200 series and DHS250 series

No	Model	Size [mm]			Thermal resistance [°C/W]		Style
		H	W	D	Convection (0.1m/s)	Forced Air	
1	F-CBS-F1	12.7	57.9	61.5	7.5	Refer Fig.7	Horizontal
2	F-CBS-F2	12.7	58.4	61.0			Vertical
3	F-CBS-F3	25.4	57.9	61.5	4.6		Horizontal
4	F-CBS-F4	25.4	58.4	61.0			Vertical
5	F-CBS-F5	38.1	57.9	61.5	3.0		Horizontal
6	F-CBS-F6	38.1	58.4	61.0			Vertical

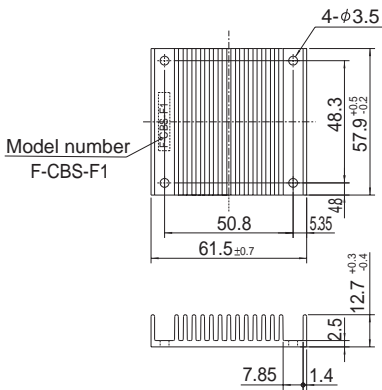


Fig.1 F-CBS-F1 external view

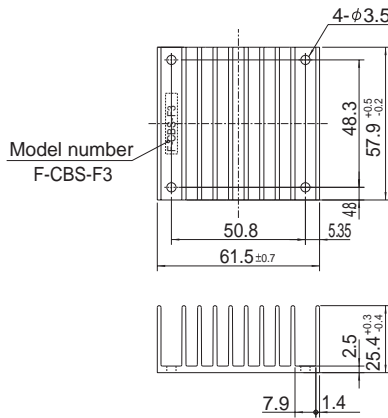


Fig.2 F-CBS-F3 external view

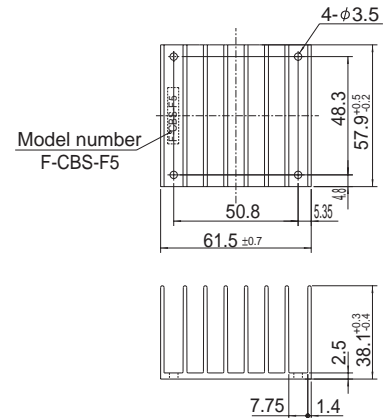


Fig.3 F-CBS-F5 external view

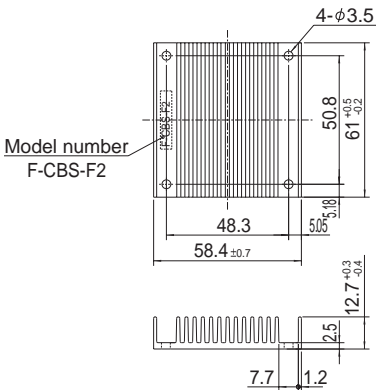


Fig.4 F-CBS-F2 external view

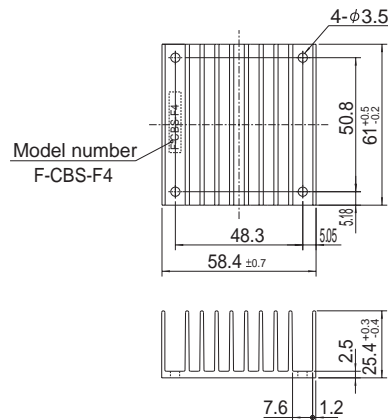


Fig.5 F-CBS-F4 external view

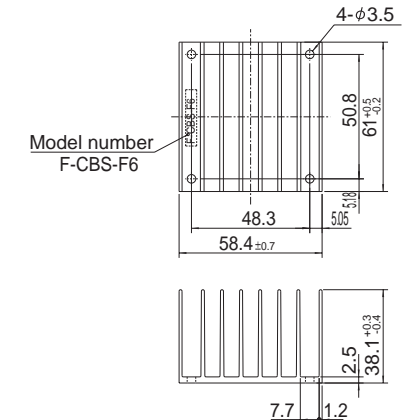


Fig.6 F-CBS-F6 external view

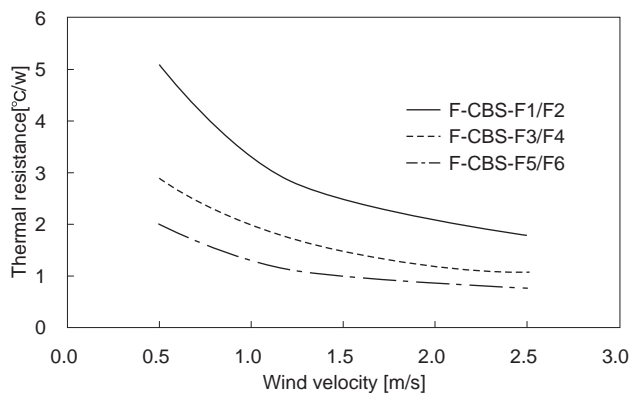


Fig.7 Thermal resistance of heat sink(Forced air)