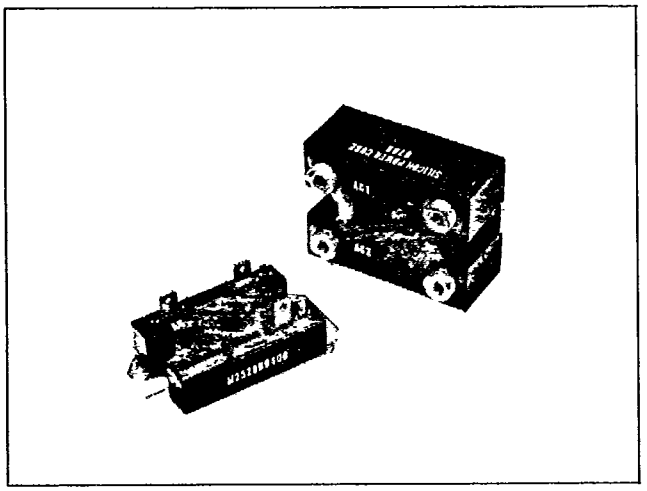
SILICON POWER CUBE

M25/M50 SERIES 35A-100A POWER DIODE CIRCUITS

T-23-09



FEATURES

- Seven Standard Diode Circuits are available — Single-Phase Bridge; 3-Phase Bridge; Diode Doubler; Center Tap Common Cathode; Center Tap Common Anode; 3-Phase Common Cathode Half-Wave Bridge and 3-Phase Common Anode Half-Wave Bridge
- SPC's unitized power hybrid technology provides highly efficient thermal management for greatly expanded cyclic life
- High terminal-to-base isolation of 2500VAC RMS
- Insulated terminal barrier available, M25E
- UL Component Recognition

PARAMETER	SYM.	UNITS	SPECIFICATION LIMITS			CONDITIONS
DC Output Current, 1ϕ (Max.)	I_O	A	35	60	100	T_C = 100°C, Max. (Table 1)
DC Output Current, 3ϕ (Max.)	I_O	A	50	60	100	T_C = 100°C, Max. (Table 1)
One-Cycle Surge Current (Peak)	I_{TSM}	A	300	1000	2000	60Hz Sine Wave, Non-Repetitive (Fig. 2)
I^2t for Fusing (Max.)	I^2t	A^2S	375	4150	16,700	60Hz Sine Wave
Reverse Blocking Voltage (Max.)	V_{RRM}	V	200-1200	200-1600		T_J = 150°C
Leakage Current (Max.)	I_{RRM}	mA	3	5		T_J = 150°C @ V_{RRM}
Forward Voltage Drop (Max.)	V_F	V	1.8 @ 100A	1.25 @ 100A	1.4 @ 200A	T_J = 25°C (Fig. 3)
Isolation Voltage (Min.)	V_{ISOL}	Vrms	2500			Any Terminal-to-Base
Junction Operating Temp. (Range)	T_J	°C	−40 to +150			
Storage Temperature (Range)	T_{STG}	°C	−40 to +150			
Thermal Resistance (Case-to-Sink)	$R\theta_{C-S}$	°C/W	0.1	0.07		With Thermal Grease
Thermal Resistance (Junction-to-Case)	$R\theta_{J-C}$	°C/W	1.8	1.25	1.0	Per Device (Table 1) See page 55 for terminal derating curves
Case Style			**M25/M25E-R**	**M50**		**See pages 53 and 54 for circuit configurations and outline dimensions**

Table 1

Thermal Resistance/Module and Maximum DC Output Current

CIRCUIT TYPE	$R\theta_{J-C}$ (°C/W)			MAX. DC OUTPUT CURRENT (A)		
	M25, M25E SERIES	M50 SERIES		M25, M25E SERIES	M50 SERIES	
SB-R	0.45	0.31	0.25	35	60	100
TB	0.30	0.21	0.17	50	60	100
DD*	0.90	0.62	0.50	20	35	50
CC	0.90	0.62	0.50	35	60	100
CA	0.90	0.62	0.50	35	60	100
THC	0.60	0.42	0.33	50	60	100
THA	0.60	0.42	0.33	50	60	100

NOTE: *Average current at 180°

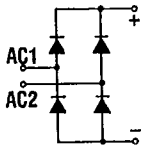
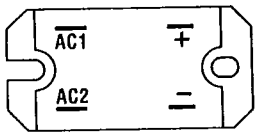
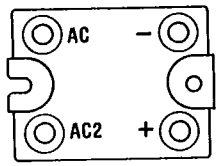
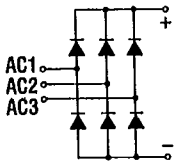
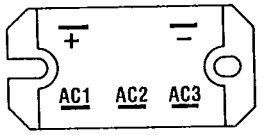
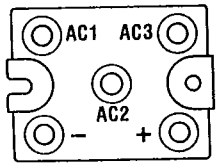
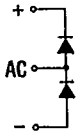
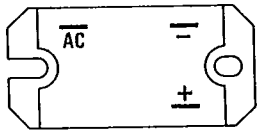
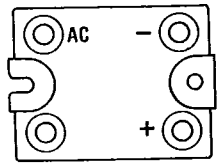
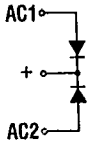
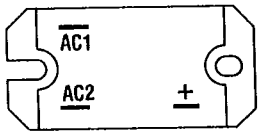
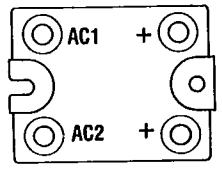
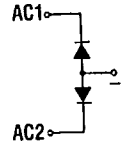
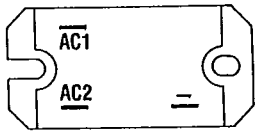
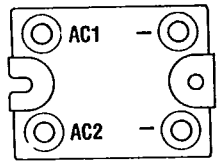
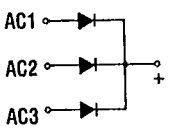
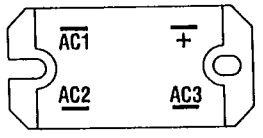
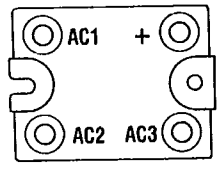
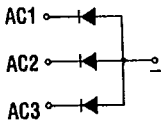
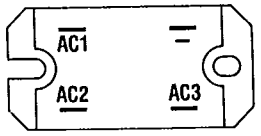
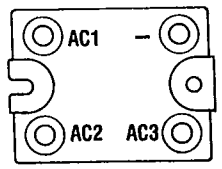
PART NUMBER DESIGNATION CODE

M25 **50** **TB** **600R**

- **M25** — CASE STYLE: M25, M25E OR M50
- **50** — MAX. DC OUTPUT CURRENT (See Table 1)
- **TB** — CIRCUIT DESIGNATION
- **600R** — BLOCKING VOLTAGE

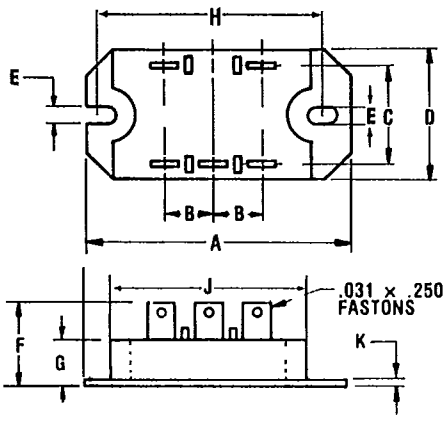
200V	1000V
400V	1200V
600V	1400V
800V	1600V

CIRCUIT CONFIGURATIONS (See page 55 for characteristic curves)

CIRCUIT TYPE	CIRCUIT DESIGNATION	CIRCUIT SCHEMATICS	CASE M25/M25E TERMINAL LOCATIONS	CASE M50 TERMINAL LOCATIONS
SINGLE-PHASE BRIDGE	SB-R			
THREE-PHASE BRIDGE (see note)	TB			
DIODE DOUBLER	DD			
CENTER TAP COMMON CATHODE	CC			
CENTER TAP COMMON ANODE	CA			
THREE PHASE COMMON CATHODE HALF WAVE BRIDGE	THC			
THREE PHASE COMMON ANODE HALF WAVE BRIDGE	THA			

NOTE Add 'R' at end of part number to reverse polarity of output terminals

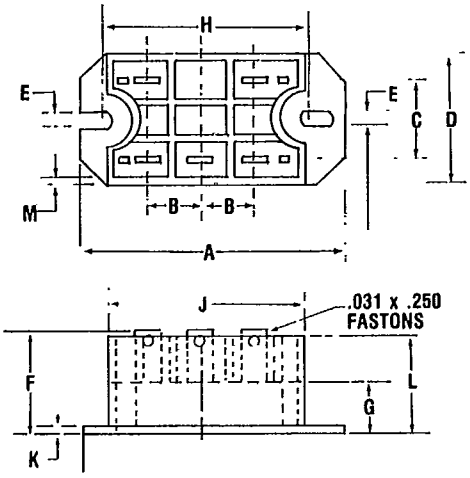
M25 OUTLINE/MOUNTING DIMENSIONS (See page 52 & 53 for product data)



DIM.	INCHES		MILLIMETERS	
	MAX.	MIN.	MAX.	MIN.
A	2.510	2.490	63.80	63.20
B	0.510	0.490	13.00	12.40
C	0.880	0.860	22.40	21.80
D	1.255	1.245	31.90	31.60
E	0.205	0.195	5.20	4.95
F	1.010	0.940	25.60	23.90
G	0.590	0.560	14.99	14.22
H	1.970	1.940	50.00	49.30
J	1.930	1.900	49.00	48.20
K	0.067	0.057	1.70	1.44

MOUNTING TORQUE REQUIRED:
(A) Mounting Screws ..... 20 in.-lbs.

M25E OUTLINE/MOUNTING DIMENSIONS

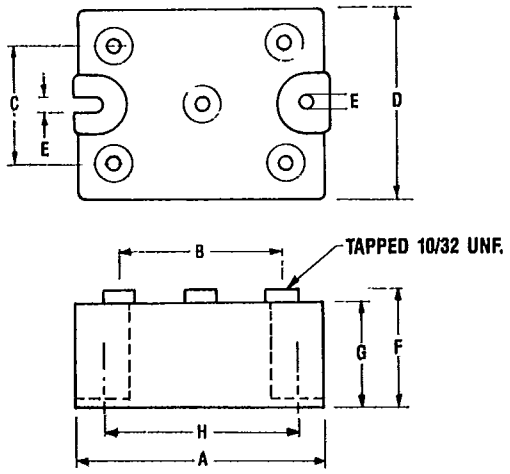


Case M25E, which features an insulated terminal barrier, can be substituted for case M25 as all electrical specifications are identical.

DIM.	INCHES		MILLIMETERS	
	MAX.	MIN.	MAX.	MIN.
A	2.510	2.490	63.80	63.20
B	0.510	0.490	13.00	12.40
C	0.880	0.860	22.40	21.80
D	1.255	1.245	31.90	31.60
E	0.205	0.195	5.20	4.95
F	1.010	0.940	25.60	23.90
G	0.590	0.560	14.99	14.22
H	1.970	1.940	30.00	49.30
J	1.930	1.900	49.00	48.20
K	0.067	0.057	1.70	1.44
L	0.940	0.860	23.88	21.85
M	0.052	0.048	1.32	1.22

MOUNTING TORQUE REQUIRED:
(A) Mounting Screws ..... 20 in.-lbs.

M50 OUTLINE/MOUNTING DIMENSIONS



DIM.	INCHES		MILLIMETERS	
	MAX.	MIN.	MAX.	MIN.
A	2.300	2.240	58.4	56.9
B	1.645	1.605	41.8	40.7
C	1.085	1.055	27.6	26.8
D	1.800	1.740	45.7	44.2
E	0.182	0.172	4.6	4.4
F	1.140	1.100	29.0	27.9
G	1.015	0.985	25.8	25.0
H	1.890	1.870	48.0	47.5

MOUNTING TORQUE REQUIRED:
(A) Mouunting Screws ..... 20 in.-lbs.
(B) Terminal Studs (Screws Supplied, Unmounted) ... 30 in.-lbs.

CHARACTERISTIC CURVES (See page 52 & 53 for product data)

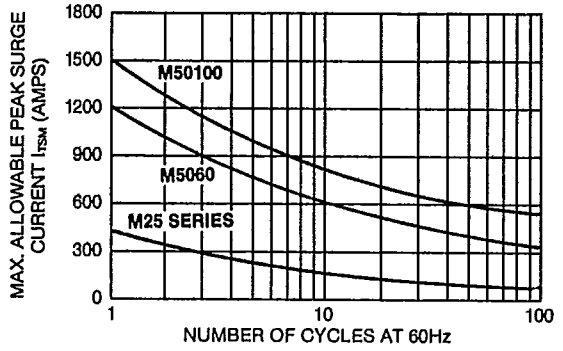


FIGURE 2 — MAX. NON-REPETITIVE SURGE CURRENT VS. DURATION

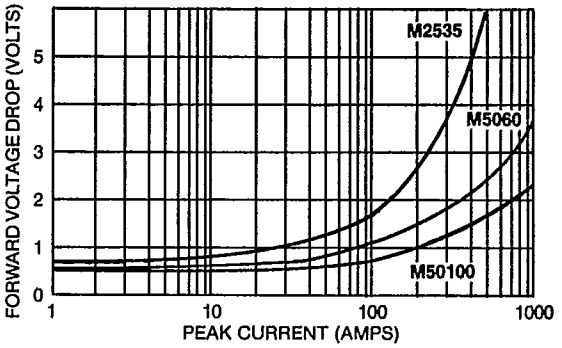


FIGURE 3 — FORWARD VOLTAGE DROP VS. CURRENT (@ 150°C)

THERMAL DERATING CURVES

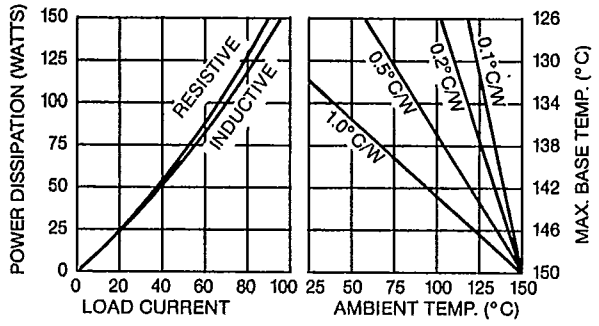


FIGURE 4 — THERMAL DERATING CURVES M50100 (SINGLE PHASE)

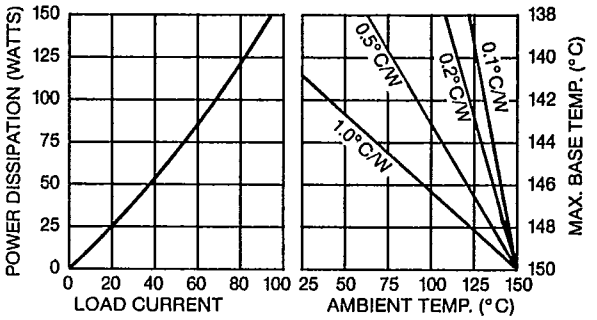


FIGURE 5 — THERMAL DERATING CURVES M50100 (THREE PHASE)

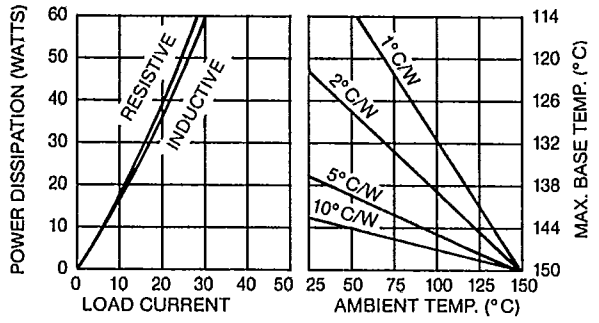


FIGURE 6 — THERMAL DERATING CURVES M2535 (SB)

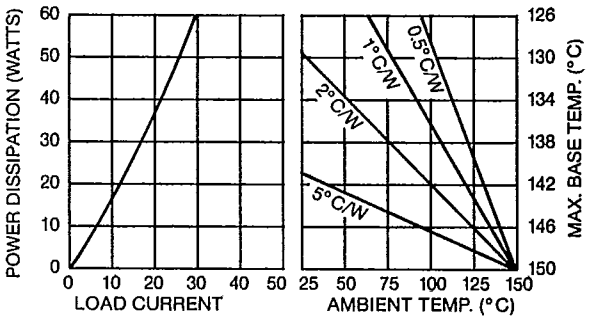


FIGURE 7 — THERMAL DERATING CURVES M2550 (TB)

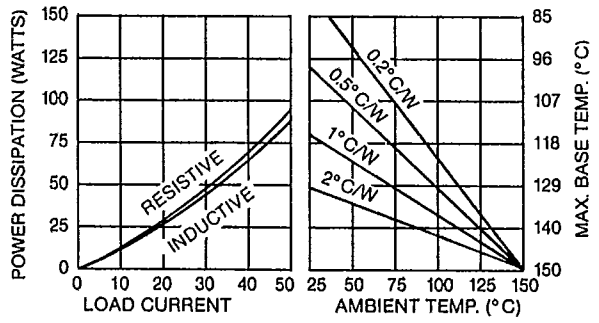


FIGURE 8 — THERMAL DERATING CURVES M5060 (SINGLE PHASE)

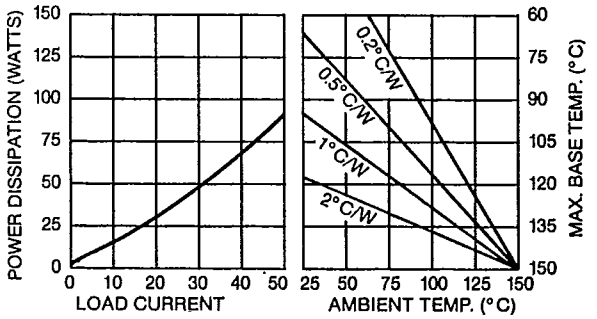


FIGURE 9 — THERMAL DERATING CURVES M5060 (THREE PHASE)

▲ **EXAMPLE:**
Knowing maximum output current and maximum ambient temperature, use derating curves to determine required heat sink and maximum allowable base plate temperature. On left hand power dissipation curve, locate the point corresponding to maximum output current. Extend a line to the right from that point to the intersection of vertical line on right hand chart corresponding to maximum ambient temperature. From heat sink curve, read directly or extrapolate required heat sink size. Extend the line farther to the right and read on the right hand scale the maximum allowable base plate temperature.