

International  
**IOR** Rectifier

**45MT160P**

**THREE PHASE CONTROLLED BRIDGE**

**Power Module**

40 A

### Features

- High thermal conductivity package, electrically insulated case
- 4000 V<sub>RMS</sub> isolating voltage

### Major Ratings and Characteristics

Parameters	45MT160P	Units
$I_o$	40(36)	A
@ $T_c$	78(85)	°C
$I_{FSM}$ @50Hz	390	A
@60Hz	410	
$I^2t$ @50Hz	770	A <sup>2</sup> s
@60Hz	700	
$I^2\sqrt{t}$	7700	A <sup>2</sup> √s
$V_{RRM}$	1600	V
$T_{STG}$ range	-40 to 150	°C
$T_J$ range Diode	-40 to 125	
$T_J$ range Scr	-40 to 100	

## 45MT160P

Bulletin I27600 rev. C 11/00

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### ELECTRICAL SPECIFICATIONS

#### Voltage Ratings

Typenumber	Voltage Code	$V_{RRM}$ , maximum repetitive peak reverse voltage V	$V_{RSM}$ , maximum non-repetitive peak reverse voltage V	$V_{DRM}$ , max. repetitive peak off-state voltage gate open circuit V	$I_{RRM}/I_{DRM}$ max. @ $T_J = T_J$ max. mA
45MT160P	160	1600	1700	1600	15

#### Forward Conduction

Parameter	45MT160P	Units	Conditions								
$I_O$ Maximum DC output current @ Case temperature	40 (36) 78 (85)	A °C	120° Rect conduction angle								
$I_{TSM}$ Maximum peak, one-cycle forward, non-repetitive on state surge current	390 410 330 345	A	<table border="1"> <tr> <td>t = 10ms</td> <td>No voltage reappplied</td> </tr> <tr> <td>t = 8.3ms</td> <td>reappplied</td> </tr> <tr> <td>t = 10ms</td> <td>100% <math>V_{RRM}</math> reappplied</td> </tr> <tr> <td>t = 8.3ms</td> <td>reappplied</td> </tr> </table>	t = 10ms	No voltage reappplied	t = 8.3ms	reappplied	t = 10ms	100% $V_{RRM}$ reappplied	t = 8.3ms	reappplied
t = 10ms	No voltage reappplied										
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t = 10ms	100% $V_{RRM}$ reappplied										
t = 8.3ms	reappplied										
$I^2t$ Maximum $I^2t$ for fusing	770 700 540 500	A <sup>2</sup> s	<table border="1"> <tr> <td>t = 10ms</td> <td>No voltage reappplied</td> </tr> <tr> <td>t = 8.3ms</td> <td>reappplied</td> </tr> <tr> <td>t = 10ms</td> <td>100% <math>V_{RRM}</math> reappplied</td> </tr> <tr> <td>t = 8.3ms</td> <td>reappplied</td> </tr> </table>	t = 10ms	No voltage reappplied	t = 8.3ms	reappplied	t = 10ms	100% $V_{RRM}$ reappplied	t = 8.3ms	reappplied
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t = 8.3ms	reappplied										
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	7700	A <sup>2</sup> √s	t = 0.1 to 10ms, no voltage reappplied								
$V_{T(TO)}$ Value of threshold voltage	0.98	V	@ $T_J$ max.								
$r_t$ Low level value on-state	11	mΩ									
$V_{TM}$ Maximum on-state voltage drop	1.33	V	$I_{pk} = 30A, T_J = 25^\circ C$ $t_p = 400\mu s$ single junction								
di/dt Maximum non-repetitive rate of rise of turned on current	150	A/μs	$T_J = 25^\circ C$ , from 0.67 $V_{DRM}$ , $I_{TM} = \pi \times I_{T(AV)}$ , $I_g = 500mA, t_r < 0.5 \mu s, t_p > 6 \mu s$								
$I_H$ Maximum Holding Current	200	mA	$T_J = 25^\circ C$ , anode supply = 6V, resistive load, gate open circuit								
$I_L$ Maximum Latching Current	400	mA	$T_J = 25^\circ C$ , anode supply = 6V, resistive load								

#### Blocking

Parameter	45MT160P	Units	Conditions
$V_{INS}$ RMS isolation voltage	4000	V	$T_J = 25^\circ C$ all terminal shorted f = 50Hz, t = 1s
dv/dt Max. critical rate of rise of off-state voltage	1000	V/μs	$T_J = T_J$ max., linear to 0.67 $V_{DRM}$ , gate open circuit

**Triggering**

Parameter	45MT160P	Units	Conditions
$P_{GM}$ Max. peak gate power	10	W	$T_J = T_J \text{ max.}$
$P_{G(AV)}$ Max. average gate power	2.5		
$I_{GM}$ Max. peak gate current	2.5	A	
$-V_{GT}$ Max. peak negative gate voltage	10	V	
$V_{GT}$ Max. required DC gate voltage to trigger	4.0	V	$T_J = -40^\circ\text{C}$
	2.5		$T_J = 25^\circ\text{C}$
	1.7		$T_J = T_J \text{ max.}$
$I_{GT}$ Max. required DC gate current to trigger	270	mA	$T_J = -40^\circ\text{C}$
	150		$T_J = 25^\circ\text{C}$
	80		$T_J = T_J \text{ max.}$
$V_{GD}$ Max. gate voltage that will not trigger	0.25	V	@ $T_J = T_J \text{ max.}$ , rated $V_{DRM}$ applied
$I_{GD}$ Max. gate current that will not trigger	6	mA	

**Thermal and Mechanical Specifications**

Parameter	45MT160P	Units	Conditions
$T_J$ Maximum junction operating temperature range	- 40 to 125 - 40 to 100	$^\circ\text{C}$	for diodes for Scr
$T_{stg}$ Maximum storage temperature range	-40 to 150	$^\circ\text{C}$	
$R_{thJC}$ Maximum thermal resistance, junction to case	0.32	K/W	DC operation per module
	1.9		DC operation per junction
	0.4		120° Rect conduction angle per module
	2.42		120° Rect conduction angle per junction
$R_{thCS}$ Maximum thermal resistance, case to heatsink	0.1	K/W	Per module Mounting surface smooth, flat an greased
T Mounting torque $\pm 10\%$ to heatsink	4	Nm	A mounting compound is recommended and the torque should be rechecked after a period of 3 hours to allow for the spread of the compound. Lubricated threads.
wt Approximate weight	60	g	

**$\Delta R$  Conduction (per Junction)**

(The following table shows the increment of thermal resistance  $R_{thJC}$  when device operate at different conduction angles than DC)

Device	Sinusoidal conduction @ $T_J \text{ max.}$					Rectangular conduction @ $T_J \text{ max.}$					Units
	180°	120°	90°	60°	30°	180°	120°	90°	60°	30°	
45MT160P	0.469	0.55	0.69	1.005	1.87	0.289	0.521	0.72	1.065	1.891	K/W

# 45MT160P

Bulletin I27600 rev. C 11/00

## Ordering Information Table

Device Code				
4	5	MT	160	P
①	②	③	④	

- 1** - Current rating code: 4 = 40 A (Avg)
- 2** - Circuit configuration code
- 3** - Essential part number
- 4** - Voltage code: Code x 10 =  $V_{RRM}$  (See Voltage Ratings Table)

## Outline Table

All dimensions are in millimeters

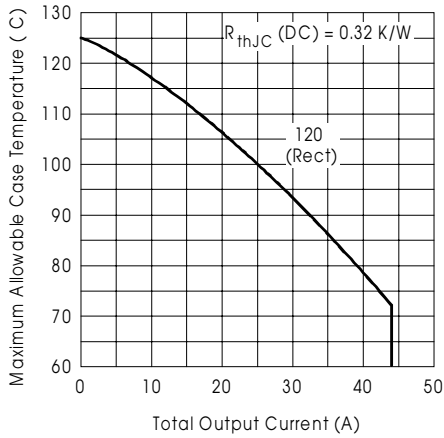


Fig. 1 - Current Rating Characteristics

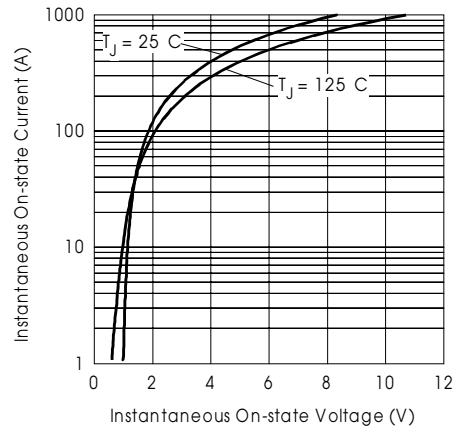


Fig. 2 - On-state Voltage Drop Characteristics

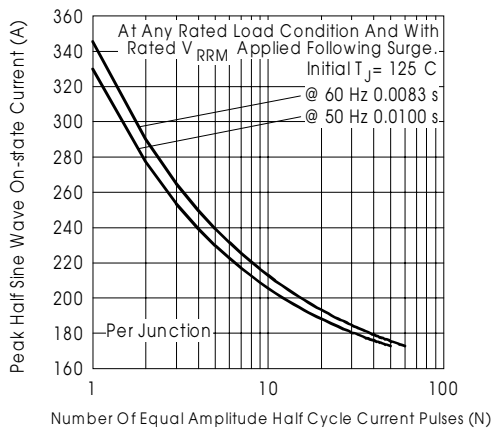


Fig. 3 - Maximum Non-Repetitive Surge Current

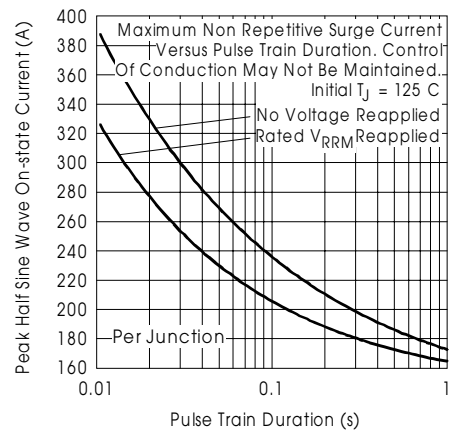


Fig. 4 - Maximum Non-Repetitive Surge Current

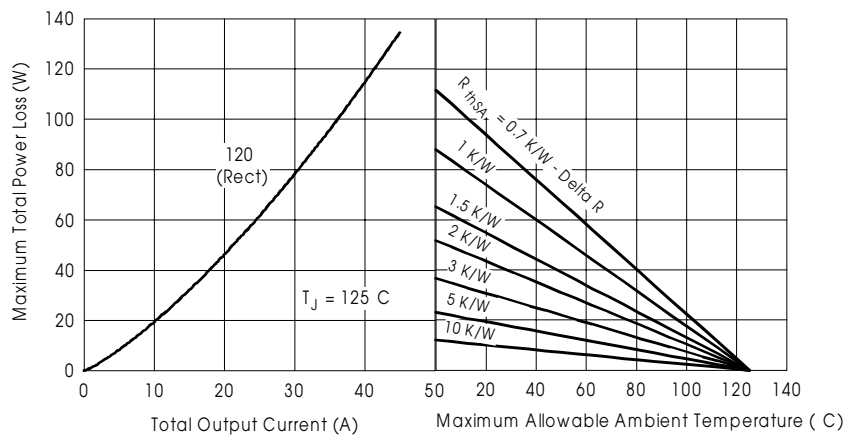


Fig. 5 - Current Rating Nomogram (1 Module Per Heatsink)

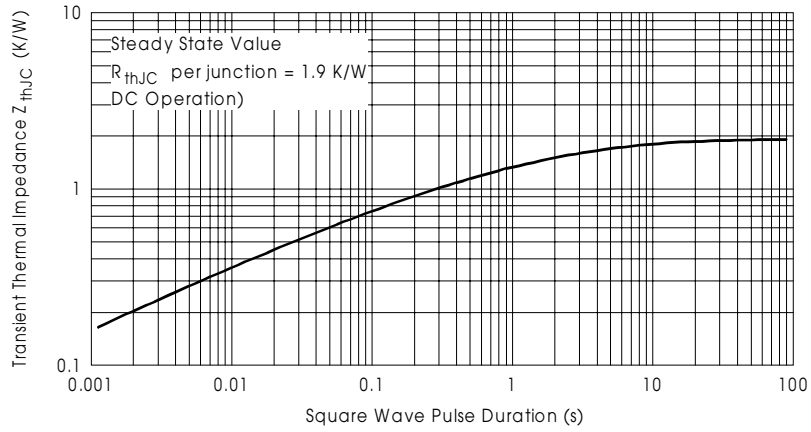


Fig. 6 - Thermal Impedance  $Z_{thJC}$  Characteristics

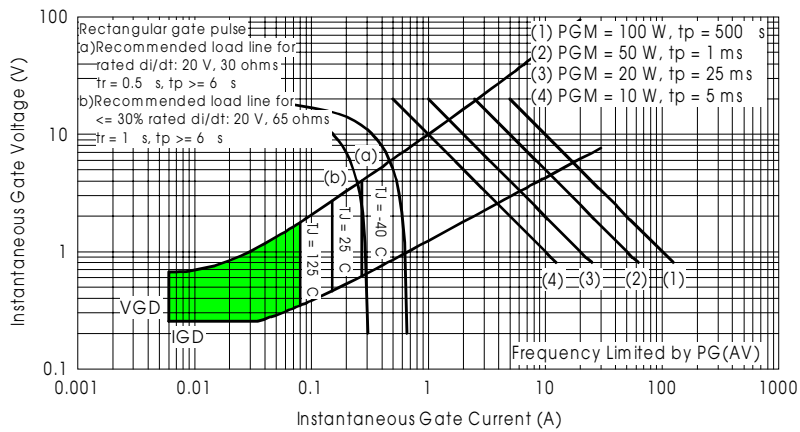


Fig. 7 - Gate Characteristics

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