

Bulletin I27600 rev.C 11/00

International IOR Rectifier

45MT160P

THREE PHASE CONTROLLED BRIDGE

Power Module

40 A

Features

- High thermal conductivity package, electrically insulated case
- 4000 V_{RMS} 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 ² s
@60Hz	700	
$I^2\sqrt{t}$	7700	A ² √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	



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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)	A	120° Rect conduction angle
	78 (85)	°C	
I_{TSM} Maximum peak, one-cycle forward, non-repetitive on state surge current	390	A	t = 10ms No voltage
	410		t = 8.3ms reapplied
	330		t = 10ms 100% V_{RRM}
	345		t = 8.3ms reapplied
I^2t Maximum I^2t for fusing	770	A ² s	t = 10ms No voltage
	700		t = 8.3ms reapplied
	540		t = 10ms 100% V_{RRM}
	500		t = 8.3ms reapplied
$I^2\sqrt{t}$ Maximum $I^2\sqrt{t}$ for fusing	7700	A ² √s	t = 0.1 to 10ms, no voltage reapplied
$V_{T(TO)}$ 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		$T_J = 25^\circ C$, 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	$^\circ\text{C}$	for diodes
	- 40 to 100		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	

ΔR 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

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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

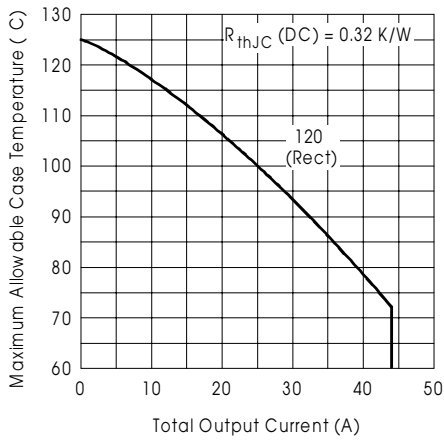


Fig. 1 - Current Rating Characteristics

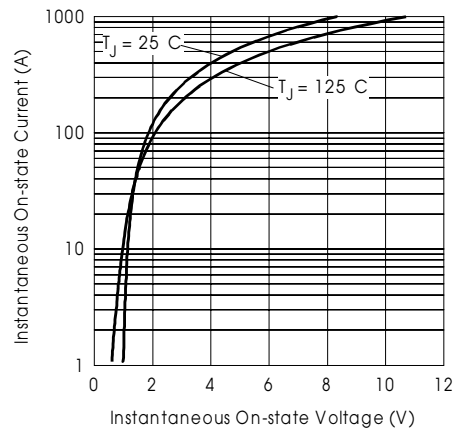


Fig. 2 - On-state Voltage Drop Characteristics

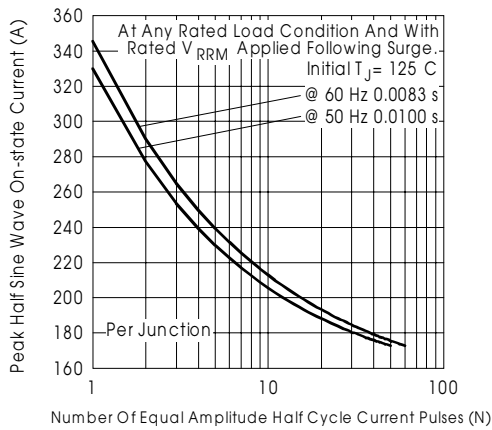


Fig. 3 - Maximum Non-Repetitive Surge Current

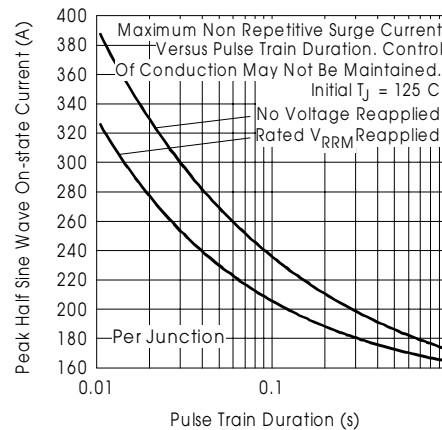


Fig. 4 - Maximum Non-Repetitive Surge Current

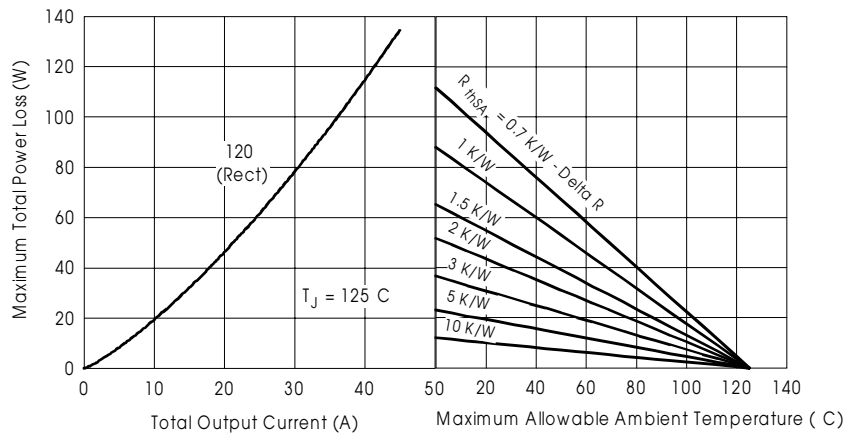


Fig. 5 - Current Rating Nomogram (1 Module Per Heatsink)

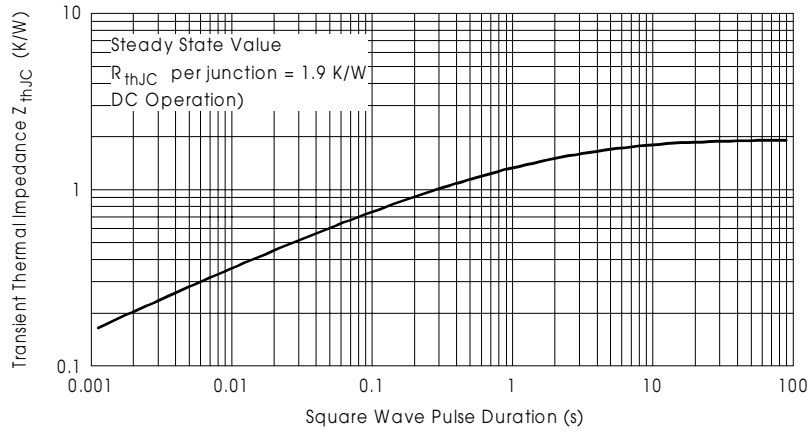


Fig. 6 - Thermal Impedance Z_{thJC} Characteristics

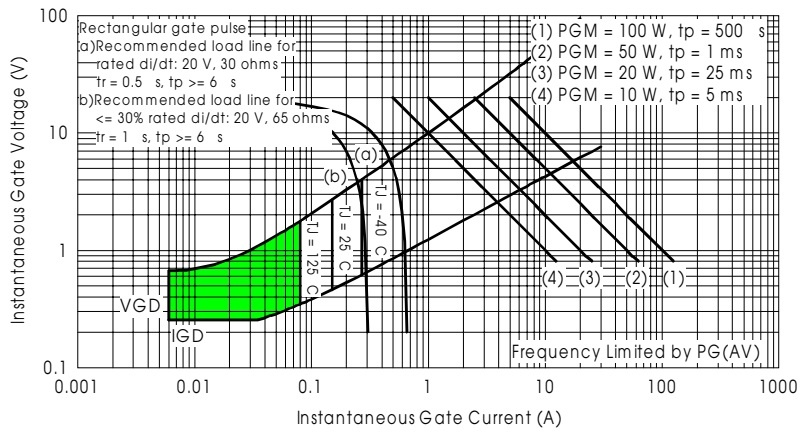


Fig. 7 - Gate Characteristics

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