MACMIC®

MMK75U160UX

1600V 75A Three Phase Diode+Thyristor Module

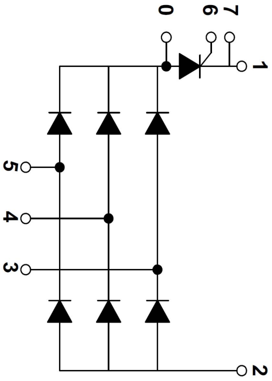
May 2015 **Version 01** **RoHS Compliant**

PRODUCT FEATURES

- Isolated Module Package
- Isolation voltage 3000 V
- Three Phase Bridge and a Thyristor

APPLICATIONS

- Current Stabilized Power Supply
- Switching Power Supply
- Inverter For AC or DC Motor Control



ABSOLUTE MAXIMUM RATINGS (Thyristor)

T $_C$ =25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		1600	V
V_{DRM}	Repetitive Peak Off-State Voltage		1600	
V_{RSM}	Non-Repetitive Peak Reverse Voltage		1700	
$I_{T(AV)}$	Average On State Current	Single phase, half wave, 180°conduction, Tc=90℃	75	A
$I_{T(RMS)}$	R.M.S. On State Current		117	
I_{TSM}	Non-Repetitive Surge On-State Current	1/2 cycle, 50/60HZ, peak value, Tc =45℃	1500/1650	
I^2t	For Fusing	1/2 cycle, 50/60HZ, peak value ,Tc =45℃	11.2/11.3	KA^2S
T_J	Junction Temperature(Thyristor)		-40 to +125	℃

ABSOLUTE MAXIMUM RATINGS (Three Phase Diode)

Symbol	Parameter/Test Conditions		Values	Unit
V_{RRM}	Repetitive Peak Reverse Voltage		1600	V
V_{RSM}	Non-Repetitive Peak Reverse Voltage		1700	
I_D	Output Current(D.C.)	Three phase, half wave, Tc= 95°C	75	A
I_{FSM}	Non-Repetitive Surge Forward Current	1/2 cycle, 50/60HZ, peak value, Tc =45℃	1050/1150	
I^2t	For Fusing	1/2 cycle, 50/60HZ, peak value ,Tc =45℃	5.5/5.49	KA^2S
T_J	Junction Temperature(Diode)		-40 to +150	℃

ELECTRICAL CHARACTERISTICS (Thyristor)

T_C=25°C unless otherwise specified

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
I_{DRM}	Maximum Peak Off-State Current	$V_D = V_{DRM}$, T_J = 125℃			25	mA
I_{RRM}	Maximum Peak Reverse Current	$V_R = V_{RRM}$, T_J = 125℃			25	
V_{TM}	Maximum on-state voltage drop	I_{TM}=250A,td=10 ms, half sine			1.5	V
V_{TO}	For power-loss calculations only	T_J = 125℃			0.85	V
r_T					2.7	mΩ
V_{GT}	Max. required DC gate voltage to trigger	V_A=6V, R_A=1Ω,T_J = -40℃			4.0	V
		V_A=6V, R_A=1Ω		1.0	2.5	
		V_A=6V, R_A=1Ω,T_J = 125℃			1.7	
I_{GT}	Max. required DC gate current to trigger	V_A=6V, R_A=1Ω,T_J = -40℃			270	mA
		V_A=6V, R_A=1Ω		75	150	
		V_A=6V, R_A=1Ω,T_J = 125℃			80	
V_{GD}	Max. required DC gate voltage not to trigger,$V_D = V_{DRM}$, T_J = 125℃				0.25	V
I_{GD}	Max. required DC gate current not to trigger,$V_D = V_{DRM}$, T_J = 125℃				6	mA
I_H	Maximum holding current			100	200	mA
I_L	Maximum latching current			200	400	mA
P_{GM}	Maximum peak gate power				12	W
$P_{G(AV)}$	Maximum average gate power				3.0	
I_{GM}	Maximum peak gate current				3.0	A
$-V_{GM}$	Maximum peak negative gate voltage				10	V
dv/dt	Critical Rate of Rise of Off-State Voltage,T_J=125℃,exponential to 67% rated V_{DRM}				1000	V/μs
di/dt	Max.Rate of Rise of Turned-on Current, T_J =125℃,I_{TM}=250A, rated V_{DRM}				150	A/μs
$R_{th(J-C)}$	Junction-to-Case Thermal Resistance				0.3	K /W

ELECTRICAL CHARACTERISTICS (Three Phase Diode)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
I_{RM}	Maximum Reverse Leakage Current	$V_R = V_{RRM}$			0.5	mA
		$V_R = V_{RRM}$, T_J = 125℃			10	
V_F	Forward Voltage Drop	I_F=75A			1.35	V
V_{TO}	For power-loss calculations only , T_J = 125°C				0.93	V
r_T					5	mΩ
$R_{th(J-C)}$	Junction-to-Case Thermal Resistance	per diode			0.9	K /W
		per module			0.15	

MODULE CHARACTERISTICS

T_C=25°C unless otherwise specified

T_J	Junction Temperature		-40 to +125	℃
T_{STG}	Storage Temperature Range		-40 to +125	℃
V_{ISO}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
Torque	to heatsink	Recommended（M6）	3～5	Nm
	to terminal	Recommended（M5）	2.5～5	Nm
Weight			215	g

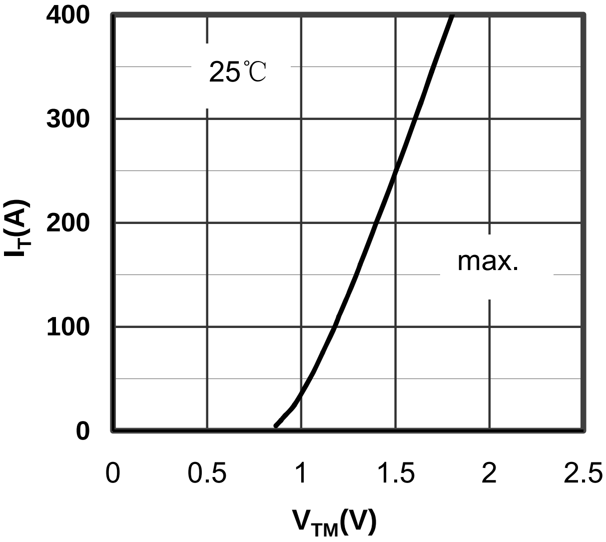


Figure1. Forward Voltage Drop vs Forward Current

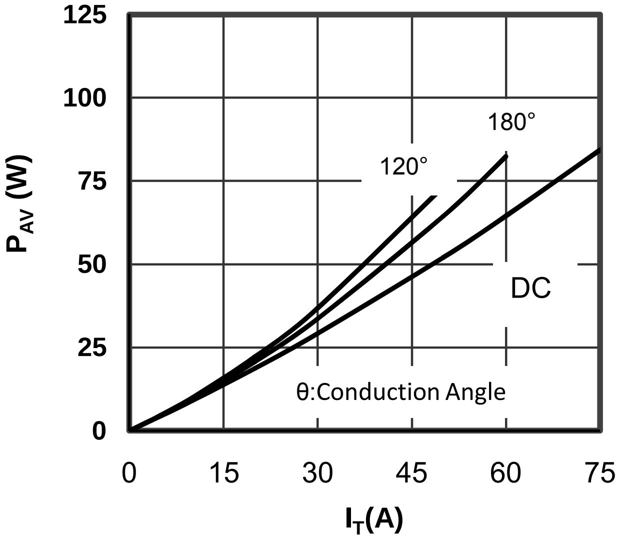


Figure2. Power dissipation vs. I_T

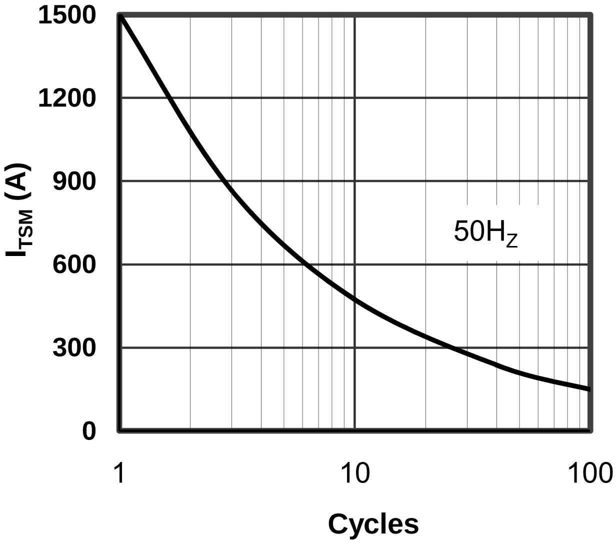


Figure3. SCR Max Non-Repetitive Surge Current

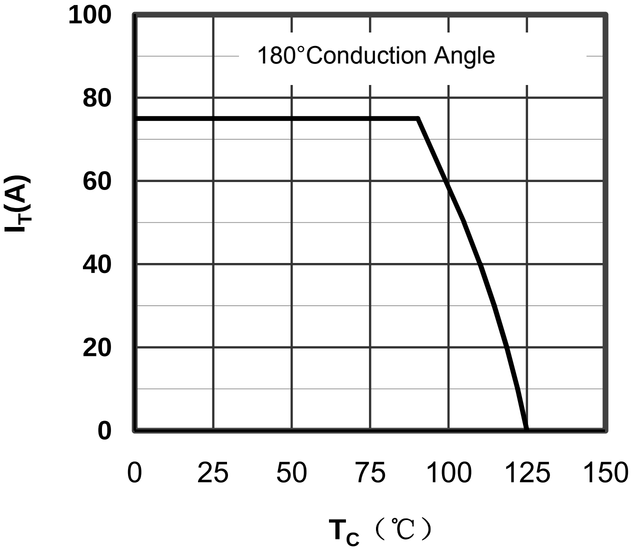


Figure4. SCR $I_{T(AV)}$vs.T_C

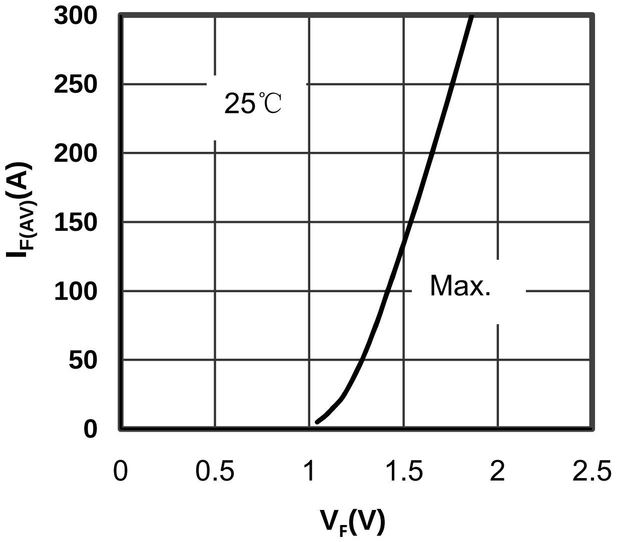


Figure5. Forward Voltage Drop vs Forward Current

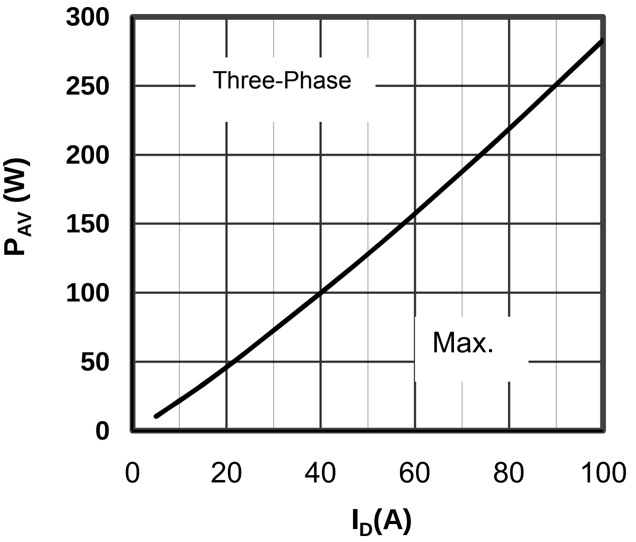


Figure6. Power dissipation vs. I_D

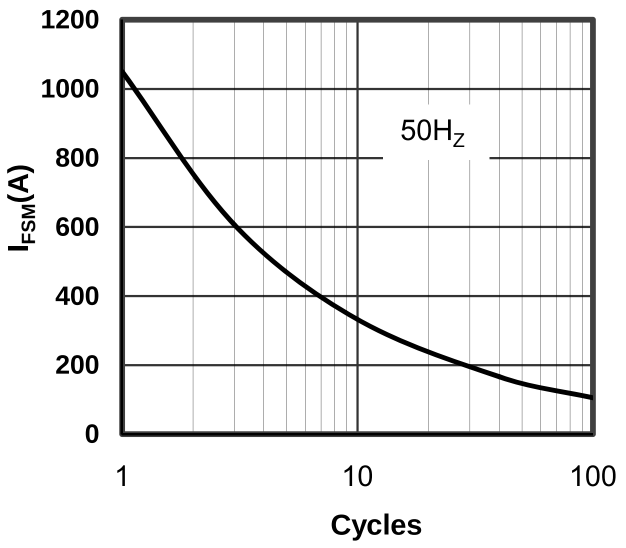


Figure7. Diode Max Non-Repetitive Surge Current

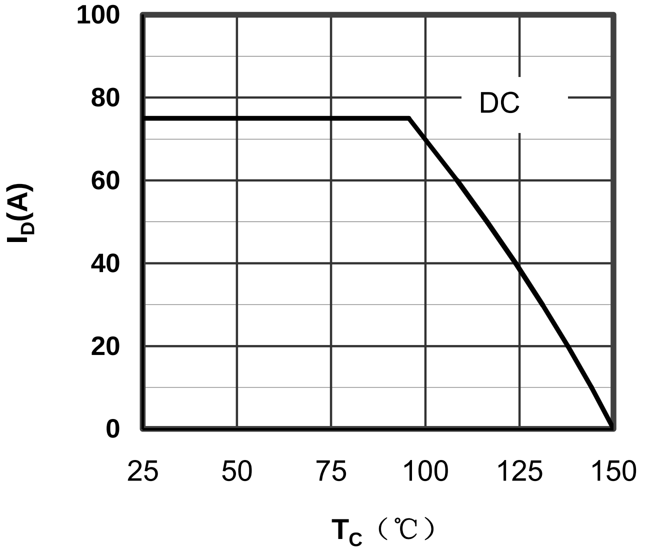


Figure8. Output current vs.Case temperature

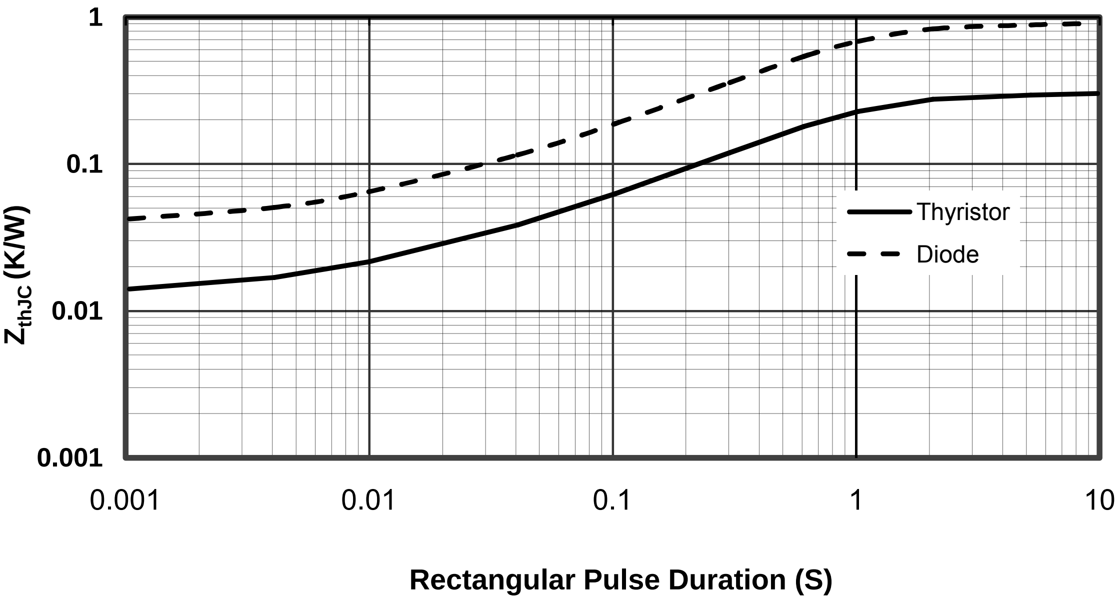


Figure9. Transient Thermal Impedance of Per Diode and SCR

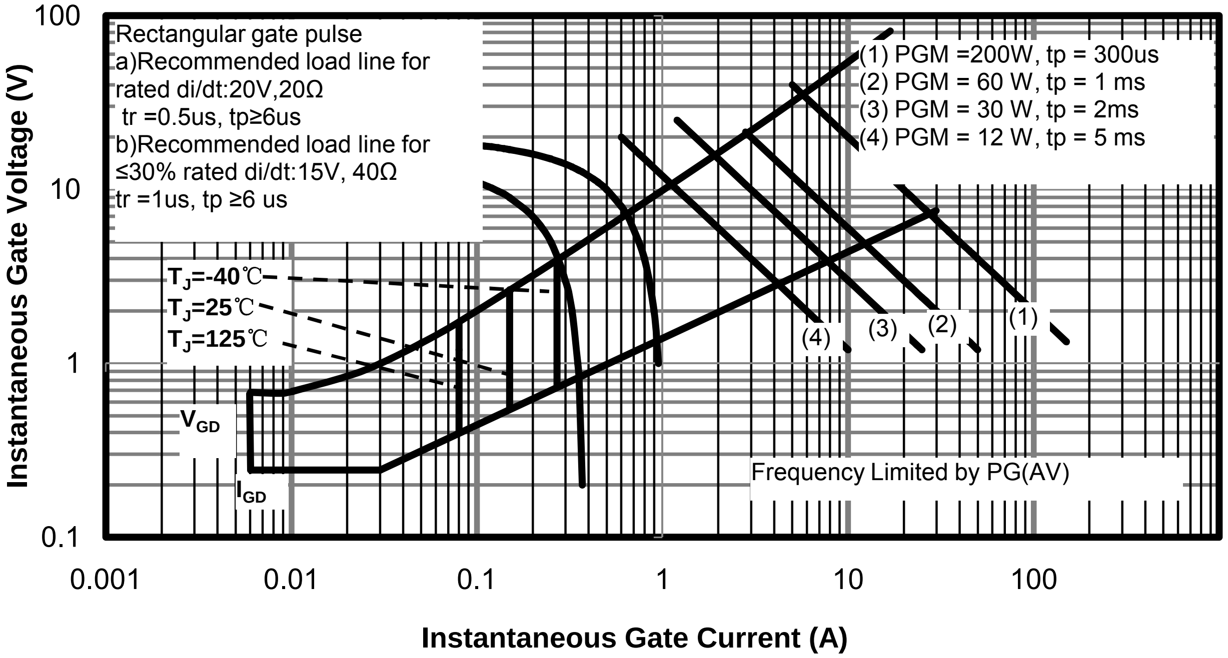
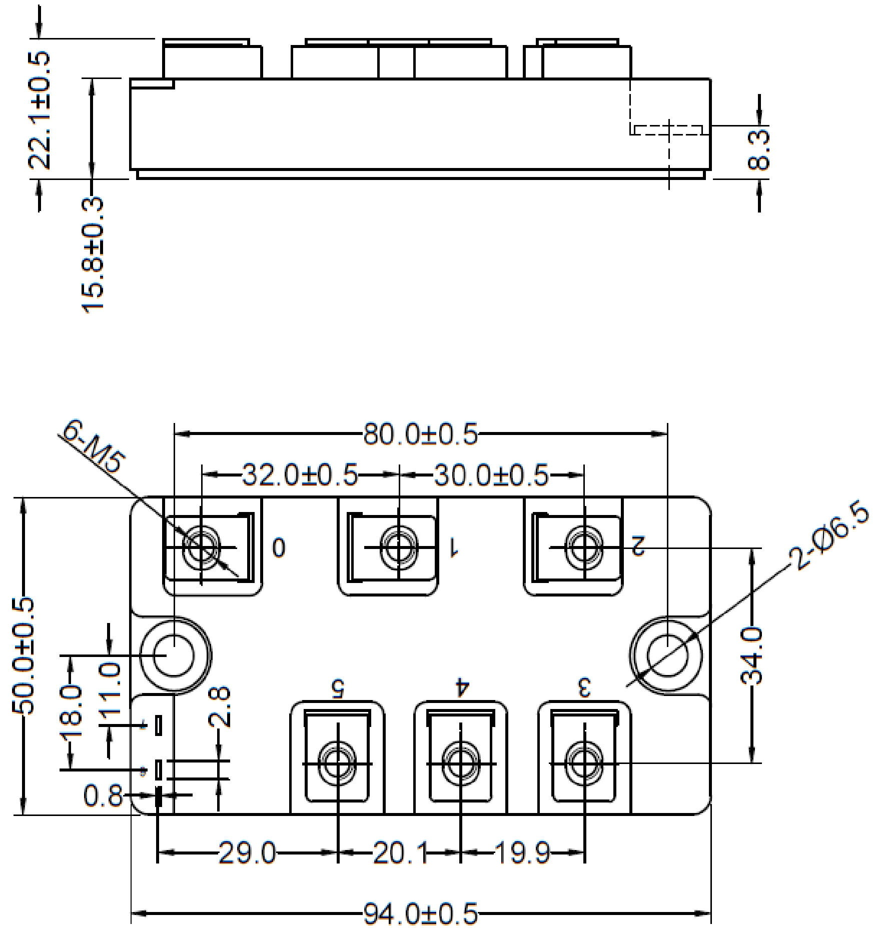


Figure 10. SCR Gate Characteristics



Dimensions in (mm)

Figure11. Package Outline