MMK40A160UK

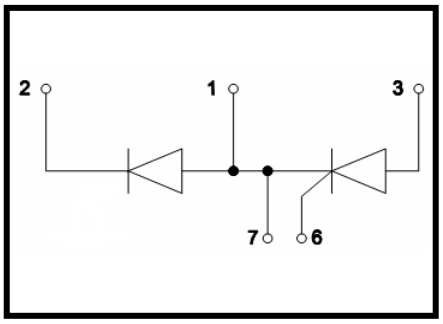
1600V 40A thyristor Module

RoHS Compliant

July 2010 **PRELIMINARY**

Features

- Isolation voltage 3000 V~
- Industrial Standard Package
- High Surge Capability
- Glass Passivated Chips
- Simple Mounting
- Electrically Isolated by DBC Ceramic



Applications

- DC Motor Control and Drives
- Battery Charges
- Welders
- Power Converters
- Lighting Control
- Heat and Temperature Control

Advantages

- Space and weight savings
- Improved temperature and power cycling

■ Diode

ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Test Condition	Value	Unit
V_{RRM}		1600	V
$I_{d(AV)}$	T_C=100℃, module	40	A
I_{FSM}	T_J=45℃; t=10ms (50Hz),sine	1000	A
	V_R=0 t=8.3ms(60Hz),sine	1080	A
	T_J=150℃; t=10ms (50Hz),sine	800	A
	V_R=0 t=8.3ms(60Hz),sine	860	A
I^2t	T_J=45℃; t=10ms (50Hz),sine	5.0	KA^2s
	V_R=0 t=8.3ms(60Hz),sine	4.8	
	T_J=150℃; t=10ms (50Hz),sine	3.2	
	V_R=0 t=8.3ms(60Hz),sine	3.1	
T_J	Junction Temperature	-40～150	℃

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ELECTRICAL AND THERMAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Test Condition	Value	Unit
I_R	V_R= V_{RRM}; T_J = 25℃	≤0.5	mA
	V_R= V_{RRM}; T_J =T_{JM}	≤5	mA
V_F	I_F=150A	1.3	V
V_{T0}	For power-loss calculations only	0.8	V
R_{thJC}	Thermal Resistance , Junction-to-Case	0.5	K/W
R_{thCS}	Thermal Resistance, Case -to-Sink	0.12	K/W

■ Thyristor

ABSOLUTE MAXIMUM RATINGS

T_C=25°C unless otherwise specified

Symbol	Test Condition	Value	Unit
V_{RRM} /V_{DRM}		1600	V
$I_{T(AV)}$	T_C=85℃, 180° conduction, half sine wave;	40	A
$I_{T(RMS)}$	as AC switch;	100	A
I_{TSM}	T_J=45℃, t=10ms (50Hz), sine, V_R=0;	850	A
	T_J=45℃, t=8.3 ms (60Hz), sine, V_R=0;	890	
	T_J=45℃, t=10ms (50Hz), sine, V_R=V_{RRM};	715	
	T_J=45℃, t=8.3 ms (60Hz), sine, V_R= V_{RRM};	750	
I^2t	T_J=45℃, t=10ms (50Hz), sine, V_R=0;	3.6	K A^2s
	T_J=45℃, t=8.3 ms (60Hz), sine, V_R=0;	3.3	
	T_J=45℃, t=10ms (50Hz), sine, V_R=V_{RRM};	2.6	
	T_J=45℃, t=8.3 ms (60Hz), sine, V_R= V_{RRM};	2.3	
I_{DRM}/I_{RRM}	V_R=V_{RRM}, V_D=V_{DRM}, gate open circuit;	0.5	mA
	T_J=125℃, V_R=V_{RRM}, V_D=V_{DRM}, gate open circuit;	15	mA
dV/dt	T_J =125℃, exponential to 67% rated V_{DRM}	1000	V/us
V_{ISOL}	50Hz, all terminals shorted, t=1min, I_{ISOL}≤1mA ;	3000	V~
T_J	Max. junction operating temperature range	-40～125	℃
T_{STG}	Max. storage temperature range	-40～125	℃

ELECTRICAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Test Condition	Min.	Typ.	Max.	Unit
V_{TO}	16.7% x π x I_{AV} < I <π x I_{AV}, T_J =125°C;			0.88	V
	I > π x I_{AV} , T_J =125°C;			0.91	V
r_t	16.7% x π x I_{AV} < I <π x I_{AV}, T_J =125°C;			5.9	mΩ
	I > π x I_{AV} , T_J =125°C;			5.74	mΩ
I_H	V_{AK}= 6V, resistive load;			200	mA
I_L	Anode supply =6V, resistive load=1Ω, gate pulse =10V, 100us;			400	mA
V_{TM}	I_{TM}=150A, t_d=10 ms, half sine			2.2	V
P_{GM}	t_p≤5ms, T_J=125°C;			10	W
$P_{GM(AV)}$	f=50Hz, T_J =125°C;			2.5	W
I_{GM}	t_p≤5ms, T_J =125°C;			2.5	A
$-V_{GT}$				10	V
V_{GT}	V_A=6V, R_A=1Ω, T_J =-40°C;			4	V
	V_A=6V, R_A=1Ω;			2.5	
	V_A=6V, R_A=1Ω, T_J=125°C;			1.7	
I_{GT}	V_A=6V, R_A=1Ω, T_J=-40°C;			270	mA
	V_A=6V, R_A=1Ω;			150	
	V_A=6V, R_A=1Ω, T_J=125°C;			80	
V_{GD}	V_{AK}=V_{DRM}, T_J=125℃			0.25	V
I_{GD}				6	mA
di/dt	T_J= 25℃, V_D=0.67V_{DRM}, I_{TM} =345A, I_g = 500mA, tr< 0.5 μs, tp > 6 μs			150	A/us

THERMAL AND MECHANICAL CHARACTERISTICS

T_C=25°C unless otherwise specified

Symbol	Test Condition	value	Unit
R_{thjc}	Thermal Resistance , Junction-to-Case	0.5	K/W
R_{THCS}	Thermal Resistance, Case -to-Sink	0.12	K/W
Md	Mounting torque(M5)	3 to 5	N·m
	Terminal connection torque(M5)		
Weight	Typical value	105	g

Characteristic curves

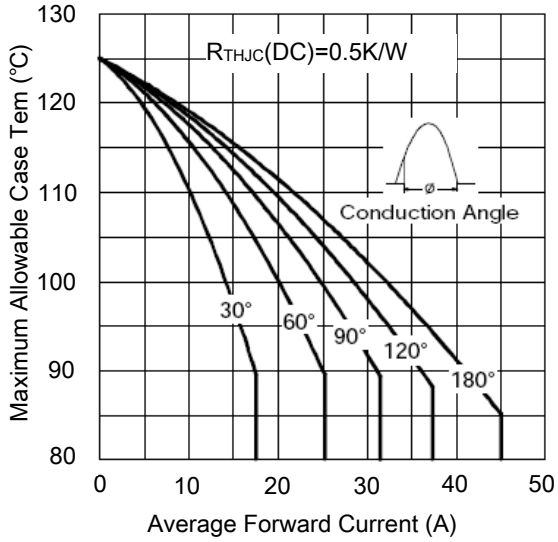

Figure 1. Current Rating Characteristics

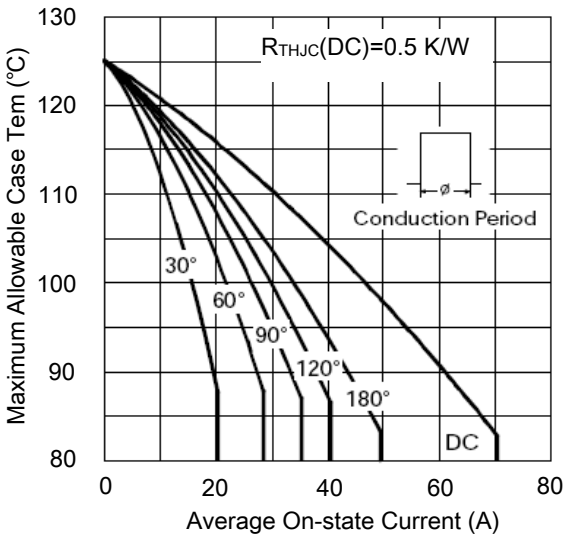

Figure 2. Current Rating Characteristics

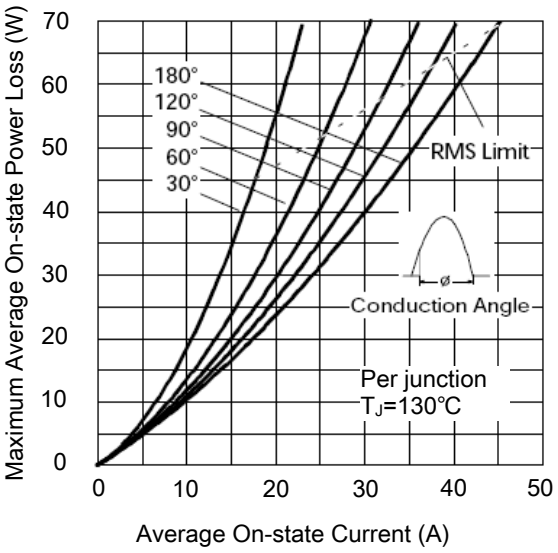

Figure 3. On-state Power Loss Characteristics

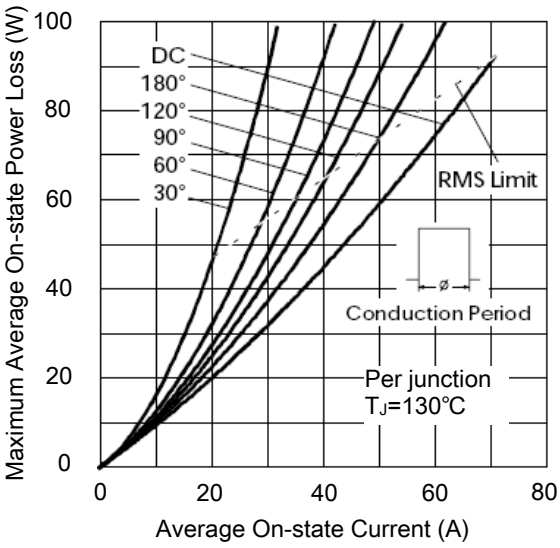

Figure 4. On-state Power Loss Characteristics

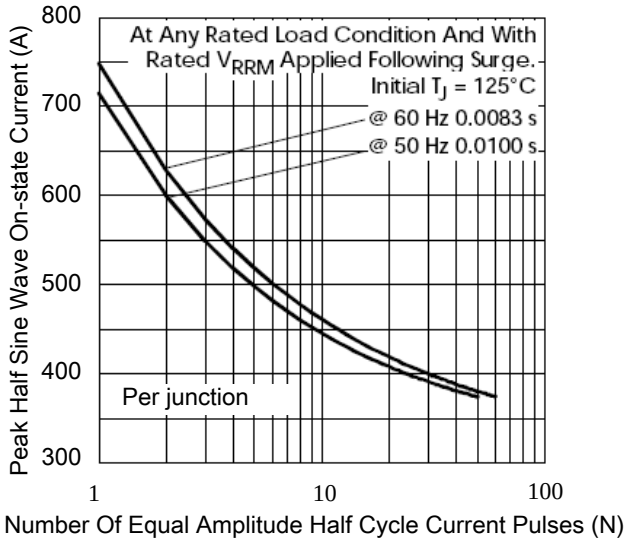

Figure 5. Maximum Non-Repetitive Surge Current

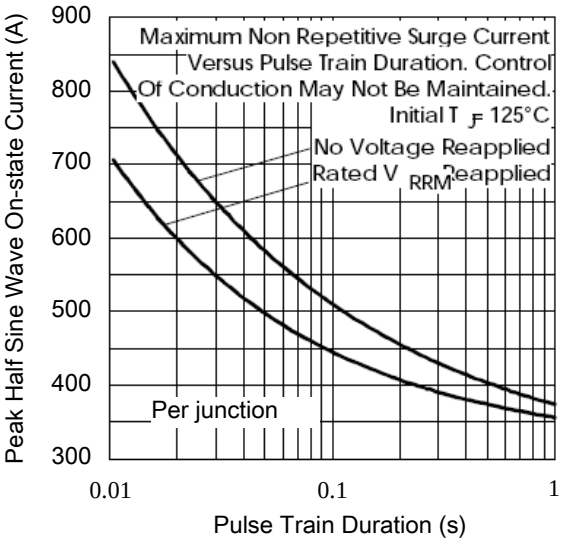

Figure 6. Maximum Non-Repetitive Surge Current

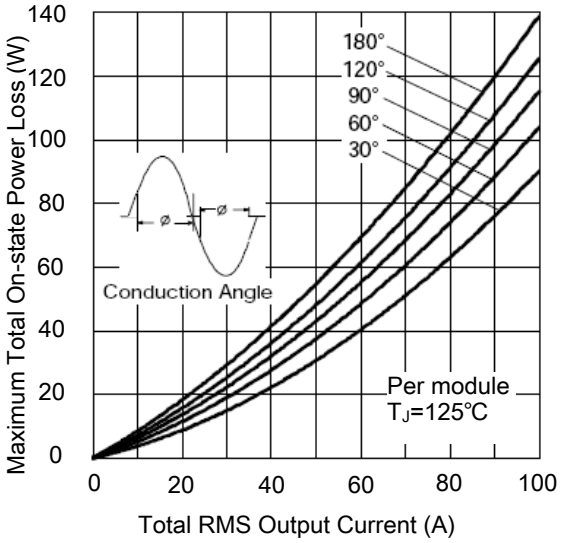

Figure 7. On-State Power Loss Characteristics-1

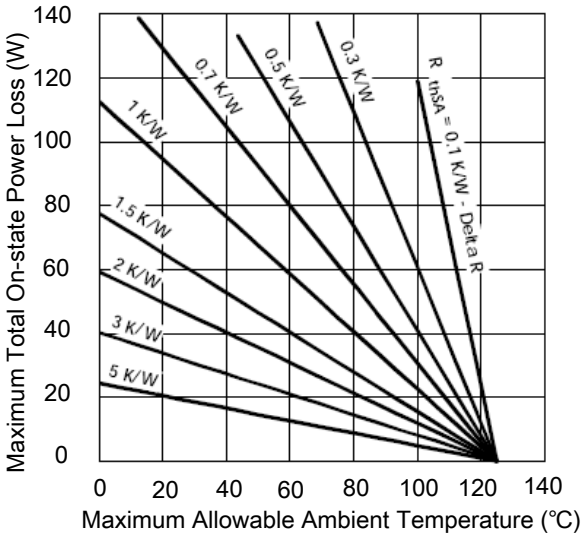

Figure 8. On-State Power Loss Characteristics-2

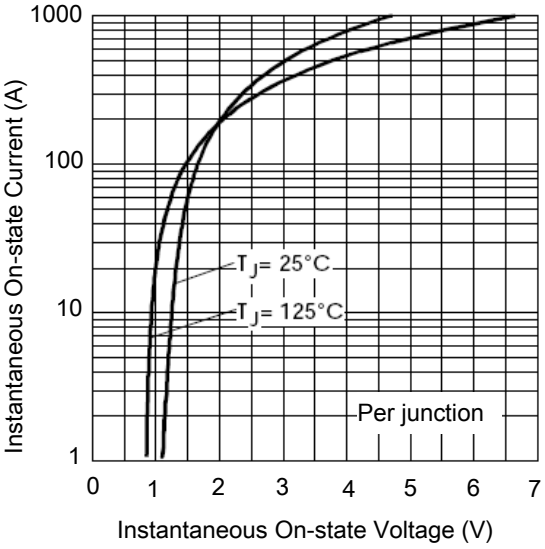

Figure 9. On-state Voltage Drop Characteristics

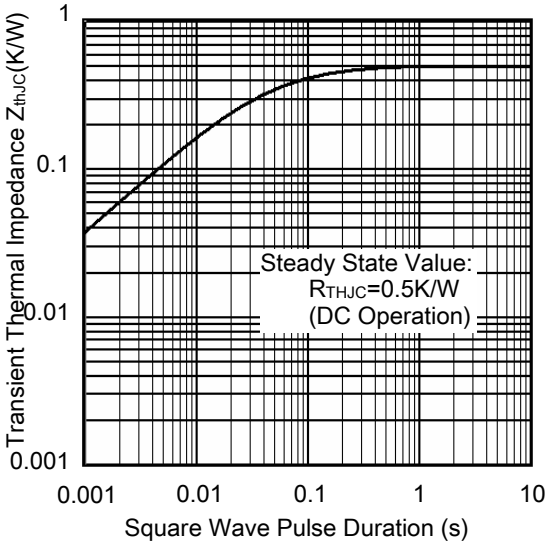

Figure 10. Thermal Impedance Z_{thJC} Characteristics

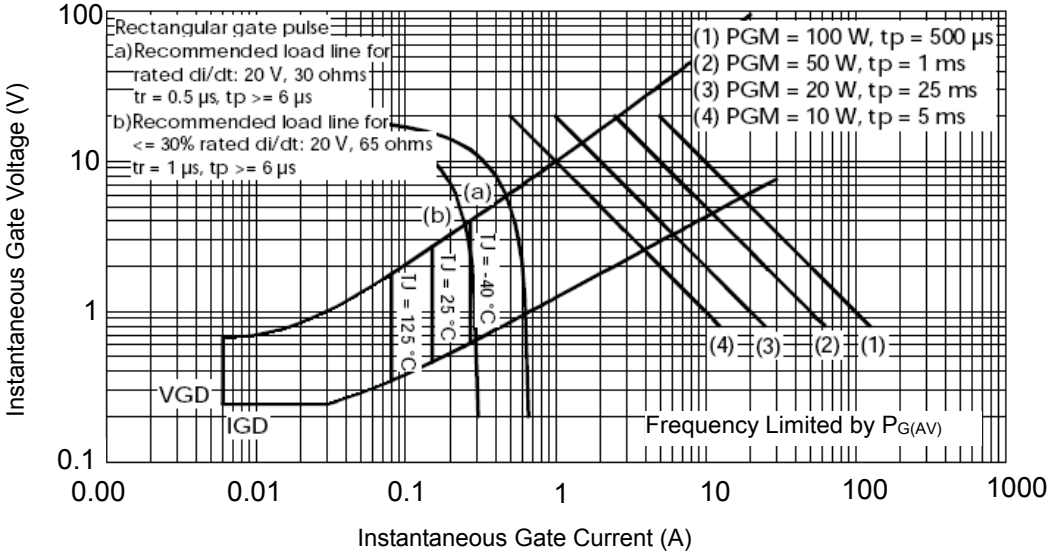

Figure.11 Gate Characteristics

Package Outline (Dimensions in mm)