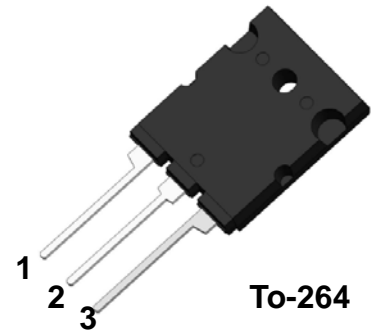


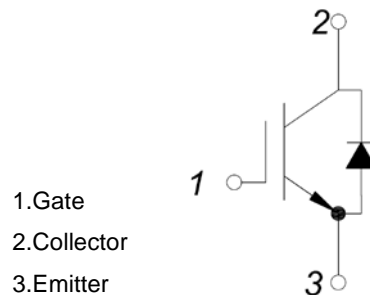
FEATURES

- Low switching losses
- Low EMI
- Fast switching and short tail current
- Free wheeling diodes with fast and soft reverse recovery
- $V_{CE(sat)}$ with positive temperature coefficient



APPLICATIONS

- High frequency switching application
- Medical applications
- Motion/servo control
- UPS systems



ABSOLUTE MAXIMUM RATINGS

$T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Values	Unit
IGBT				
V_{CES}	Collector - Emitter Voltage	$T_J=25^{\circ}\text{C}$	1200	V
V_{GES}	Gate - Emitter Voltage		± 20	V
I_C	DC Collector Current	$T_C=25^{\circ}\text{C}$	60	A
		$T_C=100^{\circ}\text{C}$	40	A
I_{Cpuls}	Pulsed collector current, tp limited by T_{Jmax}		120	A
P_{tot}	Power Dissipation		410	W
Anti-Parallel Diode				
V_{RRM}	Repetitive Reverse Voltage	$T_J=25^{\circ}\text{C}$	1200	V
$I_{F(AV)}$	Average Forward Current	$T_C=25^{\circ}\text{C}$	25	A
I_{Fpuls}	Diode pulsed current, tp limited by T_{Jmax}		50	A
T_{jmax}	Max. Junction Temperature		-40 to +150	$^{\circ}\text{C}$
T_{jop}	Operating Temperature		-40 to +150	$^{\circ}\text{C}$
T_{stg}	Storage Temperature		-55 to +150	$^{\circ}\text{C}$
Torque	Module-to-Sink	Recommended (M3)	1.1	N·m
Weight			10	g

MM40G120L

ELECTRICAL AND THERMAL CHARACTERISTICS $T_C=25^{\circ}\text{C}$ unless otherwise specified

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
IGBT						
$V_{GE(th)}$	Gate - Emitter Threshold Voltage	$V_{CE}=V_{GE}, I_C=1\text{mA}$	5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector - Emitter Saturation Voltage	$I_C=40\text{A}, V_{GE}=15\text{V}, T_{Vj}=25^{\circ}\text{C}$		2.65	3.0	V
		$I_C=40\text{A}, V_{GE}=15\text{V}, T_{Vj}=125^{\circ}\text{C}$		2.90	3.4	V
I_{CES}	Collector Leakage Current	$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{Vj}=25^{\circ}\text{C}$			2	mA
		$V_{CE}=1200\text{V}, V_{GE}=0\text{V}, T_{Vj}=125^{\circ}\text{C}$			10	mA
I_{GES}	Gate Leakage Current	$V_{CE}=0\text{V}, V_{GE} \pm 15\text{V}, T_{Vj}=125^{\circ}\text{C}$	-400		400	nA
Q_g	Gate Charge	$V_{CE}=600\text{V}, I_C=40\text{A}, V_{GE}=15\text{V}$		0.24		μC
C_{ies}	Input Capacitance	$V_{CE}=25\text{V}, V_{GE}=0\text{V}, f=1\text{MHz}$		3.2		nF
C_{res}	Reverse Transfer Capacitance			0.18		nF
$t_{d(on)}$	Turn - on Delay Time	$V_{CC}=600\text{V}, I_C=40\text{A}, T_j=25^{\circ}\text{C}$		40		ns
		$R_G=15\Omega, T_j=125^{\circ}\text{C}$		50		ns
t_r	Rise Time	$V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$		60		ns
		Inductive Load $T_j=125^{\circ}\text{C}$		65		ns
$t_{d(off)}$	Turn - off Delay Time	$V_{CC}=600\text{V}, I_C=40\text{A}, T_j=25^{\circ}\text{C}$		320		ns
		$R_G=15\Omega, T_j=125^{\circ}\text{C}$		360		ns
t_f	Fall Time	$V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$		70		ns
		Inductive Load $T_j=125^{\circ}\text{C}$		100		ns
E_{on}	Turn - on Energy	$V_{CC}=600\text{V}, I_C=40\text{A}, T_j=25^{\circ}\text{C}$		3.4		mJ
		$R_G=15\Omega, T_j=125^{\circ}\text{C}$		4.2		mJ
E_{off}	Turn - off Energy	$V_{GE}=15\text{V}, T_j=25^{\circ}\text{C}$		2.2		mJ
		Inductive Load $T_j=125^{\circ}\text{C}$		3.6		mJ
I_{sc}	Short Circuit Current	$t_{psc} \leq 10\mu\text{s}, V_{GE}=15\text{V}$ $T_j=125^{\circ}\text{C}, V_{CC}=600\text{V}$		200		A
R_{thJC}	Junction-to-Case Thermal Resistance				0.3	K/W
Anti-Parallel Diode						
V_F	Forward Voltage	$I_F=25\text{A}, V_{GE}=0\text{V}, T_{Vj}=25^{\circ}\text{C}$		1.65	2.15	V
		$I_F=25\text{A}, V_{GE}=0\text{V}, T_{Vj}=125^{\circ}\text{C}$		1.65		V
I_{RRM}	Max. Reverse Recovery Current	$I_F=25\text{A}, V_R=600\text{V}$		44		A
Q_{rr}	Reverse Recovery Charge	$di_F/dt=-1000\text{A}/\mu\text{s}$		5.0		μC
E_{rec}	Reverse Recovery Energy	$T_{Vj}=125^{\circ}\text{C}$		2.0		mJ
R_{thJCD}	Junction-to-Case Thermal Resistance				1.2	K/W

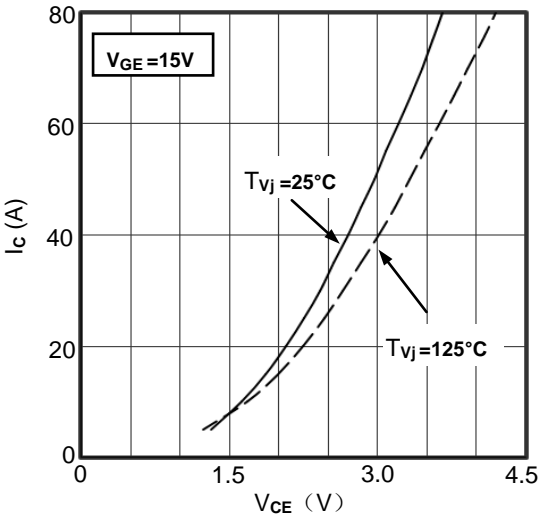


Figure1. Typical Output Characteristics

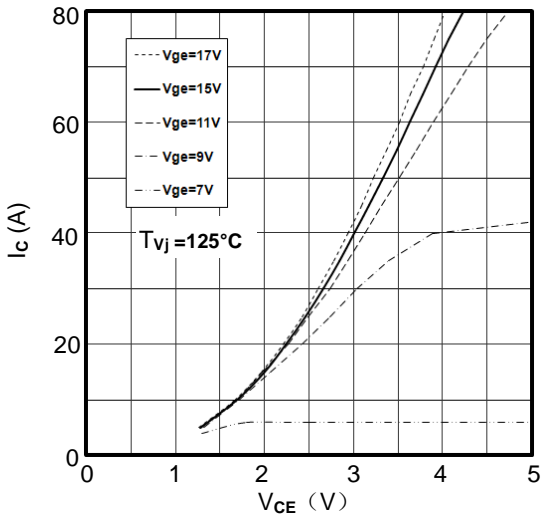


Figure2. Typical Output Characteristics

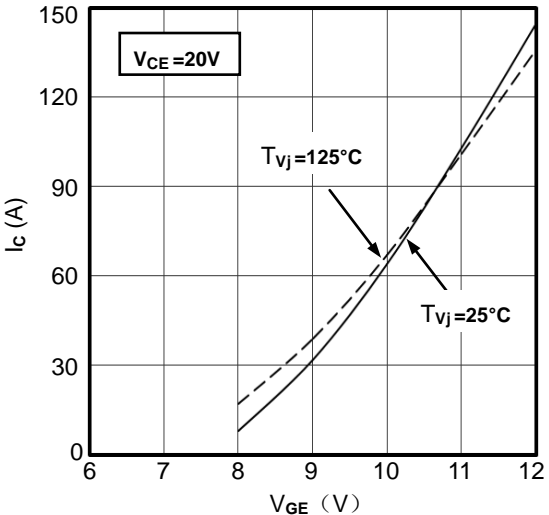


Figure3. Typical Transfer characteristics

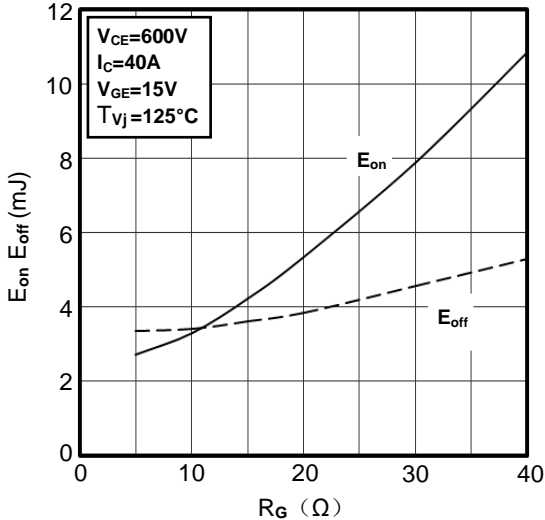


Figure4. Switching Energy vs. Gate Resistor

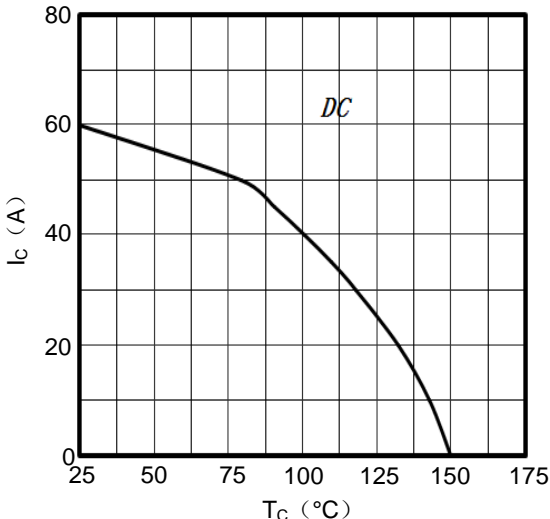


Figure5. IGBT Tc vs. Collector Current

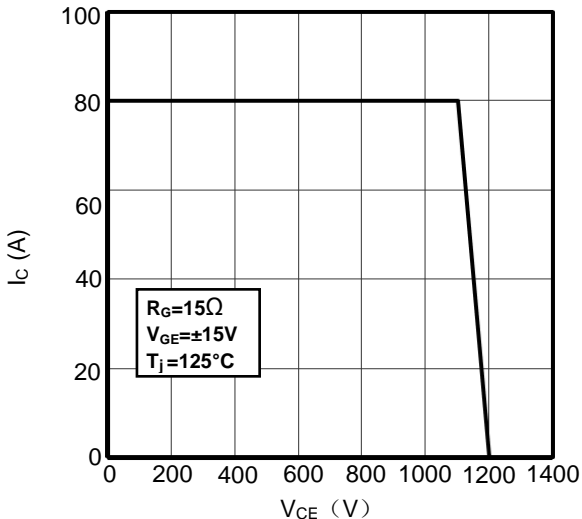


Figure6. Reverse Biased Safe Operating Area

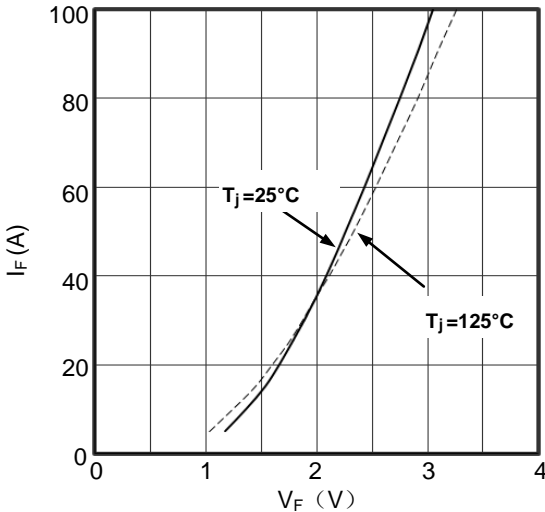


Figure7. Diode Forward Characteristics

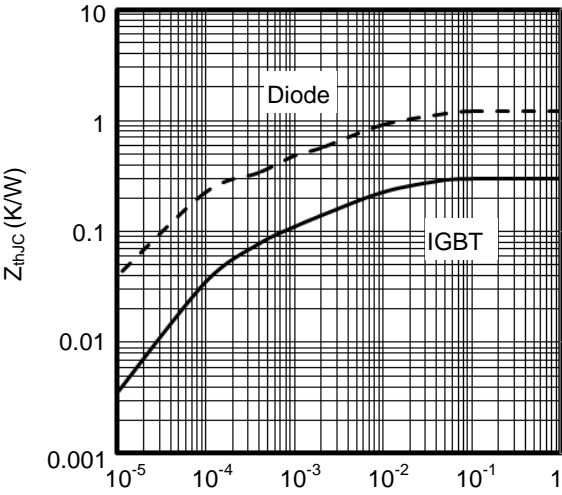
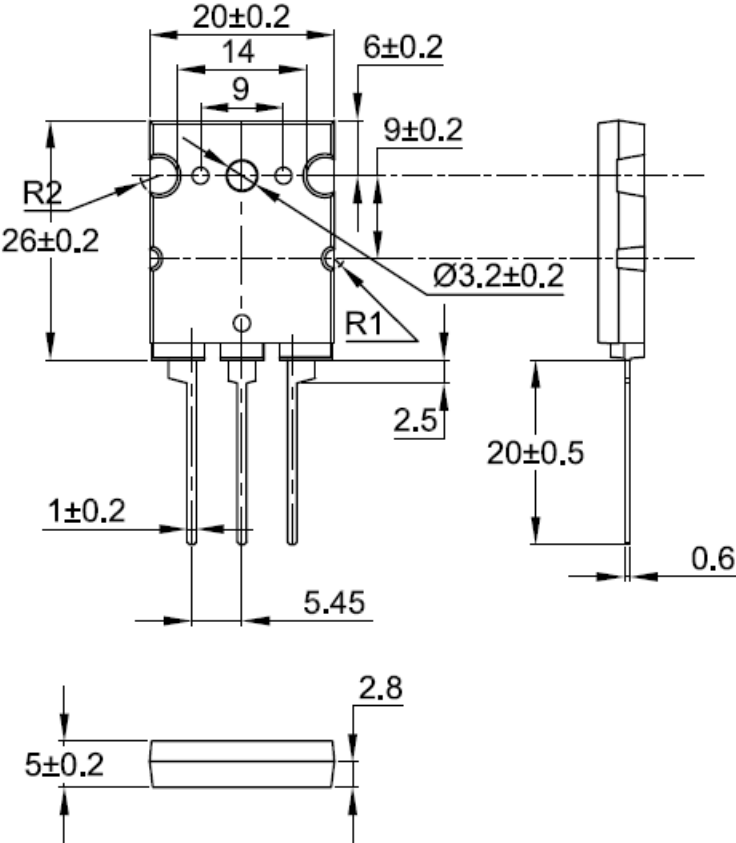


Figure8. Transient Thermal Impedance



Dimensions in Millimeters
Figure 9. Package Outline