

SM2G40SH120G3B

NPT & The Third Generation Technology 1200V IGBT Module

Features

- $BV_{CES}=1200V$
- Low Conduction Loss: $V_{CE(sat)} = 2.5 V @ I_C=40A$
- Fast & Soft Anti-Parallel FWD
- Short Circuit rated:10us at $T_C=100^{\circ}C$
- Isolation Type Package

Applications

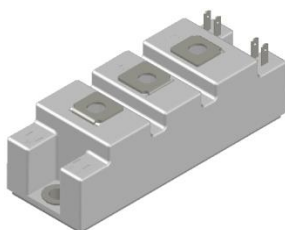
- Induction Heating, Motor Drives, High Power Inverters
- Welding Machine, UPS

Description

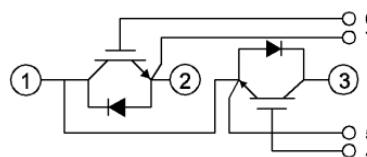
The IGBT Module 7SM-1 package devices are optimized to reduce losses and switching noise in high frequency power conditioning electrical systems.

These IGBT Module series are ideally suited for IH ,High Power inverters, Motors drives and other applications where switching losses are significant portion of the total losses.

Package Type & Internal Circuit



7SM-1



Equivalent Circuit

Absolute Maximum Ratings (at $T_C=25^{\circ}C$ unless otherwise noted)

Symbol	Parameter		Ratings	Unit
V_{CES}	Collector to Emitter Voltage		1200	V
V_{GES}	Gate to Emitter Voltage		± 20	V
I_C	Collector Current	$T_C=25^{\circ}C$	60	A
		$T_C=100^{\circ}C$	40	A
I_{CM}	Pulsed Collector Current , tp=1ms		80	A
I_F	Diode Continuous Forward Current	$T_C=100^{\circ}C$	40	A
I_{FM}	Diode Maximum Forward Current		80	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}C$	332	W
T_J	Operating Junction Temperature Range		-55~+150	$^{\circ}C$
T_{STG}	Storage Temperature Range		-55~+125	$^{\circ}C$
V_{ISO}	Isolation Voltage	AC 1minute	2500	V
	Mounting screw Torque: M6		4	N.M
	Weight		155	g

Thermal Characteristics

Symbol	Parameter	Ratings	Unit
$R_{th(J-C)}$ (IGBT)	Thermal Resistance, Junction to case for IGBT	0.37	$^{\circ}C/W$
$R_{th(J-C)}$ (Diode)	Thermal Resistance, Junction to case for Diode	0.8	$^{\circ}C/W$
$R_{th(C-A)}$	Thermal Resistance, Case to Ambient	0.05	$^{\circ}C/W$

**Electrical Characteristics of IGBT** @ $T_C=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	Collector to Emitter Breakdown Voltage	$V_{GE}=0V, I_C=1mA$	1200	-	-	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C=40A, V_{GE}=15V$	-	2.5	3.0	V
		$I_C=40A, V_{GE}=15V, T_C=100^{\circ}\text{C}$	-	3.2	-	V
$V_{GE(th)}$	Gate Threshold Voltage	$V_{CE}=V_{GE}, I_C=2mA$	4.5	-	7.5	V
I_{CES}	Zero Gate Voltage Collector Current	$V_{CE}=V_{CES}, V_{GE}=0V$	-	-	1	mA
I_{GES}	Gate to Emitter Leakage Current	$V_{GE}=V_{GES}, V_{CE}=0V$	-	-	± 250	nA

Electrical Characteristics of Diode @ $T_C=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
V_F	Diode Forward Voltage	$I_F=40A$	-	2.9	3.4	V
		$I_F=40A, T_C=100^{\circ}\text{C}$	-	2.4	-	V
t_{rr}	Diode Reverse Recovery Time	$I_F=40A, di/dt=-200A/\mu s$	-	90	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	5.5	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	240	-	nC
t_{rr}	Diode Reverse Recovery Time	$I_F=40A, di/dt=-200A/\mu s, T_C=100^{\circ}\text{C}$	-	190	-	ns
I_{rr}	Diode Peak Reverse Recovery Current		-	10.5	-	A
Q_{rr}	Diode Reverse Recovery Charge		-	850	-	nC

Switching Characteristics @ $T_C=25\text{ }^{\circ}\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	$I_C=40A, V_{CC}=600V, V_{GE}=\pm 15V, R_G=10\Omega, \text{Inductive Load}$	-	50	-	ns
t_r	Rise Time		-	30	-	ns
$t_{d(off)}$	Turn-off Delay Time		-	220	-	ns
t_f	Fall Time		-	55	-	ns
E_{on}	Turn-on Switching Loss		-	3.4	-	mJ
E_{off}	Turn-off Switching Loss		-	2.8	-	mJ
E_{ts}	Total Switching Loss		-	6.2	-	mJ
C_{ies}	Input Capacitance	$V_{GE}=0V, V_{CE}=30V, f=1.0MHz$	-	3400	-	pF
C_{res}	Reverse Transfer Capacitance		-	370	-	pF
C_{oes}	Output Capacitance		-	125	-	pF
Q_g	Total Gate Charge	$I_C=40A, V_{CC}=600V, V_{GE}=\pm 15V$	-	220	-	nC
Q_{ge}	Gate to Emitter Charge		-	25	-	nC
Q_{gc}	Gate to Collector Charge		-	130	-	nC
t_{sc}	Short Circuit Withstand Time	$V_{CC}=600V, V_{GE}=\pm 15V, R_G=10\Omega @T_C=100^{\circ}\text{C}$	10	-	-	us

Typical Performance Characteristics

Fig. 1. Typical Output Characteristics

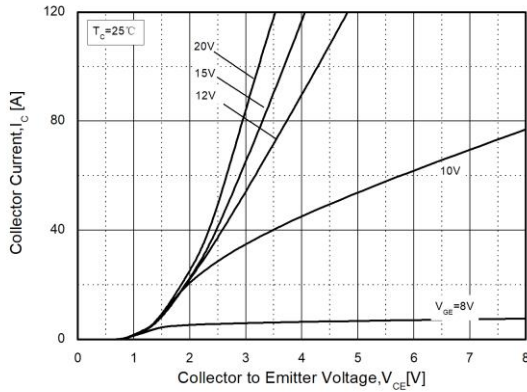


Fig. 2. Typical Output Characteristics

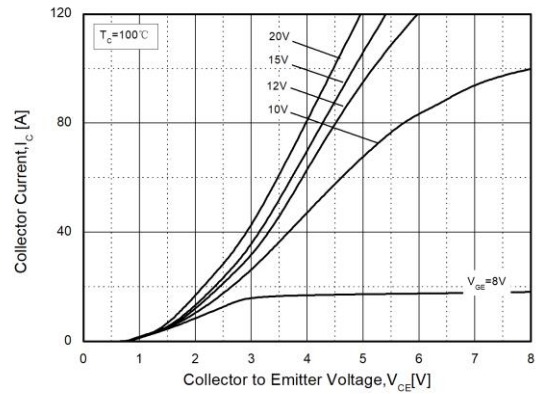


Fig. 3. Typical Saturation Voltage Characteristics

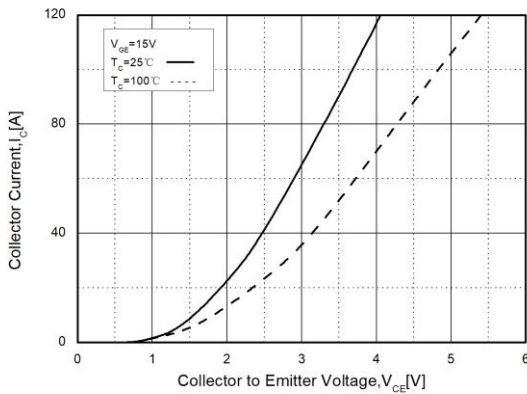


Fig. 4. Gate Charge Characteristics

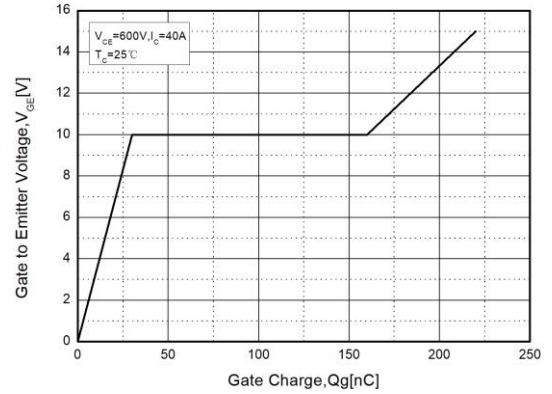


Fig. 5. Turn-on Characteristics vs. R_G

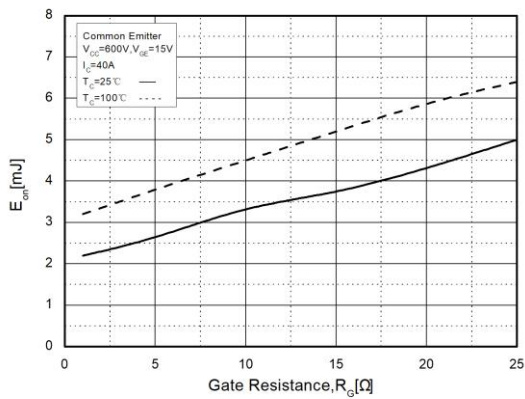
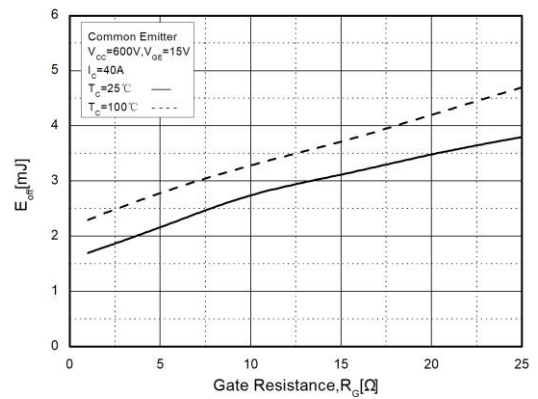


Fig. 6. Turn-off Characteristics vs. R_G



Typical Performance Characteristics

Fig. 7. Rate Current vs. T_C

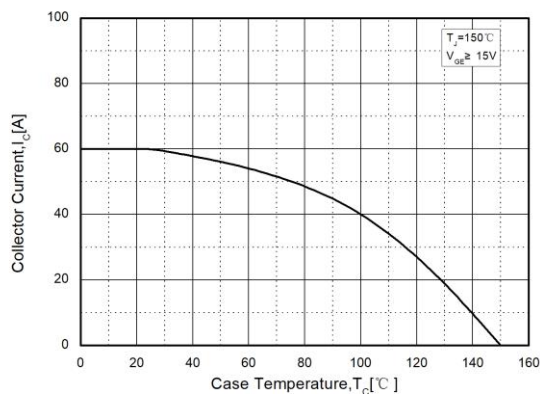


Fig. 8. Power Dissipation vs. T_C

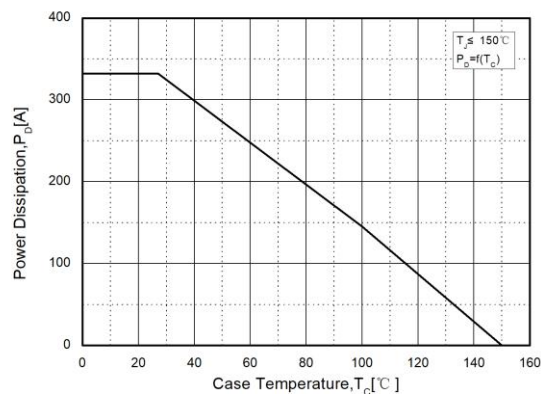


Fig. 9. Transient Thermal Impedance

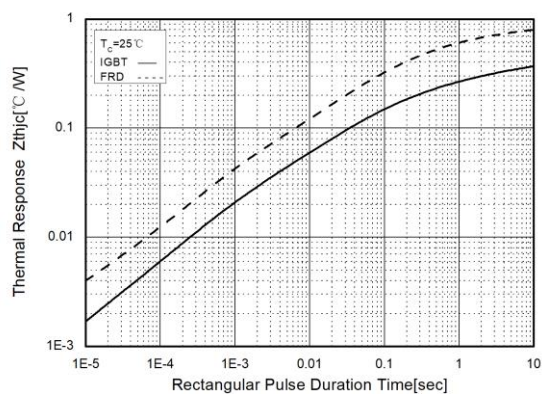
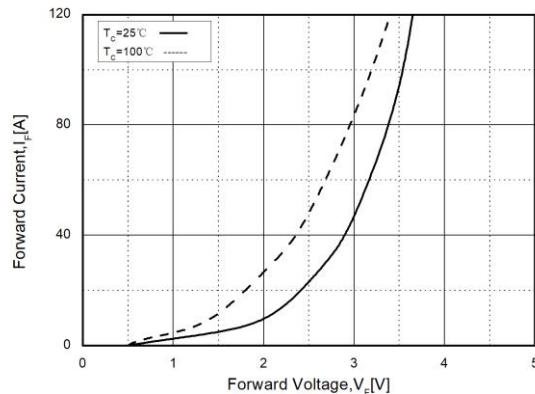
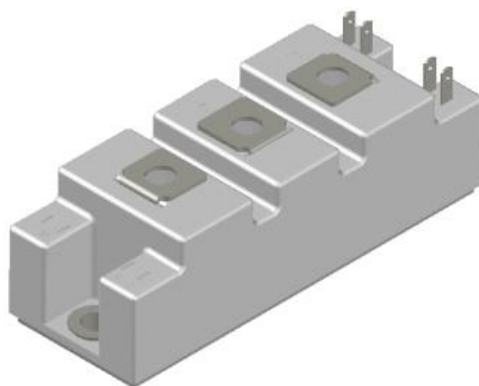


Fig. 10. Forward Characteristics

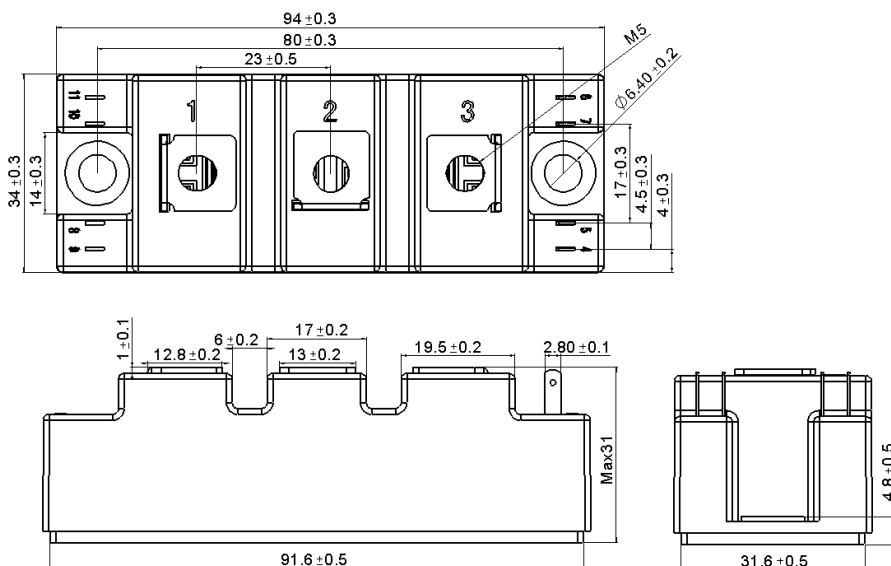


Package Dimensions

7SM-1



(Dimensions in Millimeters)



DISCLAIMER:

The products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any product can reasonably be expected to result in a personal injury. Seller's customers using or selling seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

Sunnychip reserves the right to change the specifications and circuitry without notice at any time. Sunnychip does not consider responsibility for use of any circuitry other than circuitry entirely included in a Sunnychip product.  is a registered trademark of Sunnychip Semiconductor Co., Ltd.