

International IOR Rectifier

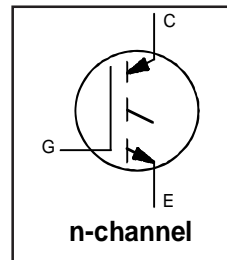
INSULATED GATE BIPOLAR TRANSISTOR

GA200SA60SP

Standard Speed IGBT

Features

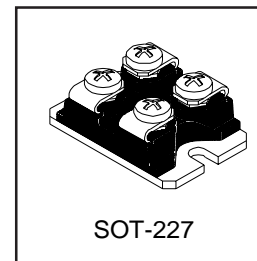
- Standard : Optimized for minimum saturation voltage and low operating frequencies up to 1kHz
- Lowest conduction losses available
- Fully isolated package (2,500 volt AC)
- Very low internal inductance (5 nH typ.)
- Industry standard outline
- UL pending
- Totally Lead-Free



$V_{CES} = 600V$
$V_{CE(on) typ.} = 1.10V$
@ $V_{GE} = 15V, I_C = 100A$

Benefits

- Designed for increased operating efficiency in power conversion: UPS, SMPS, Welding, Induction heating
- Easy to assemble and parallel
- Direct mounting to heatsink
- Plug-in compatible with other SOT-227 packages



Absolute Maximum Ratings

	Parameter	Max.	Units
V_{CES}	Collector-to-Emitter Breakdown Voltage	600	V
$I_C @ T_C = 25^\circ C$	Continuous Collector Current	200	A
$I_C @ T_C = 100^\circ C$	Continuous Collector Current	100	
I_{CM}	Pulsed Collector Current ①	400	
I_{LM}	Clamped Inductive Load Current ②	400	
V_{GE}	Gate-to-Emitter Voltage	± 20	V
E_{ARV}	Reverse Voltage Avalanche Energy ③	155	mJ
V_{ISOL}	RMS Isolation Voltage, Any Terminal to Case, $t=1$ min	2500	V
$P_D @ T_C = 25^\circ C$	Maximum Power Dissipation	630	W
$P_D @ T_C = 100^\circ C$	Maximum Power Dissipation	250	
T_J	Operating Junction	-55 to + 150	$^\circ C$
T_{STG}	Storage Temperature Range	-55 to + 150	
	Mounting Torque, 6-32 or M3 Screw	12 lbf •in(1.3N•m)	

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.20	$^\circ C/W$
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.05	—	
Wt	Weight of Module	30	—	gm

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Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
V _{(BR)CES}	Collector-to-Emitter Breakdown Voltage	600	—	—	V	V _{GE} = 0V, I _C = 250μA
V _{(BR)ECS}	Emitter-to-Collector Breakdown Voltage ④	18	—	—	V	V _{GE} = 0V, I _C = 1.0A
ΔV _{(BR)CES/ΔT_J}	Temperature Coeff. of Breakdown Voltage	—	0.62	—	V/°C	V _{GE} = 0V, I _C = 1.0mA
V _{CE(ON)}	Collector-to-Emitter Saturation Voltage	—	1.10	1.3	V	I _C = 100A V _{GE} = 15V
		—	1.33	—		I _C = 200A See Fig.2, 5
		—	1.02	—		I _C = 100A, T _J = 150°C
V _{GE(th)}	Gate Threshold Voltage	3.0	—	6.0		V _{CE} = V _{GE} , I _C = 250μA
ΔV _{GE(th)/ΔT_J}	Temperature Coeff. of Threshold Voltage	—	-10	—	mV/°C	V _{CE} = V _{GE} , I _C = 2 mA
g _{re}	Forward Transconductance ⑤	90	150	—	S	V _{CE} = 100V, I _C = 100A
I _{CES}	Zero Gate Voltage Collector Current	—	—	1.0	mA	V _{GE} = 0V, V _{CE} = 600V
		—	—	10		V _{GE} = 0V, V _{CE} = 10V, T _J = 150°C
I _{GES}	Gate-to-Emitter Leakage Current	—	—	±250	nA	V _{GE} = ±20V

Switching Characteristics @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
Q _g	Total Gate Charge (turn-on)	—	770	1200	nC	I _C = 100A
Q _{ge}	Gate - Emitter Charge (turn-on)	—	100	150		V _{CC} = 400V See Fig. 8
Q _{gc}	Gate - Collector Charge (turn-on)	—	260	380		V _{GE} = 15V
t _{d(on)}	Turn-On Delay Time	—	78	—	ns	T _J = 25°C I _C = 100A, V _{CC} = 480V V _{GE} = 15V, R _G = 2.0Ω Energy losses include "tail" See Fig. 9, 10, 13
t _r	Rise Time	—	56	—		
t _{d(off)}	Turn-Off Delay Time	—	890	1300		
t _f	Fall Time	—	390	580		
E _{on}	Turn-On Switching Loss	—	0.98	—		
E _{off}	Turn-Off Switching Loss	—	17.4	—	mJ	See Fig. 9, 10, 13
E _{is}	Total Switching Loss	—	18.4	25.5		
t _{d(on)}	Turn-On Delay Time	—	72	—	ns	T _J = 150°C, I _C = 100A, V _{CC} = 480V V _{GE} = 15V, R _G = 2.0Ω Energy losses include "tail" See Fig. 10,11, 13
t _r	Rise Time	—	60	—		
t _{d(off)}	Turn-Off Delay Time	—	1500	—		
t _f	Fall Time	—	660	—		
E _{is}	Total Switching Loss	—	35.7	—		
L _E	Internal Emitter Inductance	—	5.0	—	nH	Between lead, and center of the die contact
C _{ies}	Input Capacitance	—	16250	—	pF	V _{GE} = 0V V _{CC} = 30V See Fig. 7 f = 1.0MHz
C _{oes}	Output Capacitance	—	1040	—		
C _{res}	Reverse Transfer Capacitance	—	190	—		

Notes:

- ① Repetitive rating; V_{GE} = 20V, pulse width limited by max. junction temperature. (See fig. 15)
- ② V_{CC} = 80%(V_{CES}), V_{GE} = 20V, L = 10μH, R_G = 2.0Ω, (See fig. 14)
- ③ Repetitive rating; pulse width limited by maximum junction temperature.
- ④ Pulse width ≤ 80μs; duty factor ≤ 0.1%.
- ⑤ Pulse width 5.0μs, single shot.

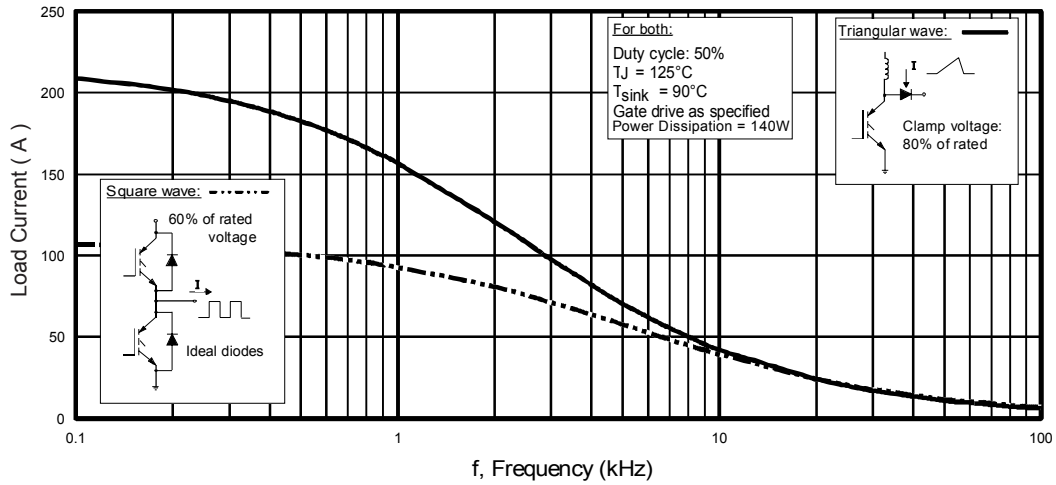


Fig. 1 - Typical Load Current vs. Frequency
 (Load Current = I_{RMS} of fundamental)

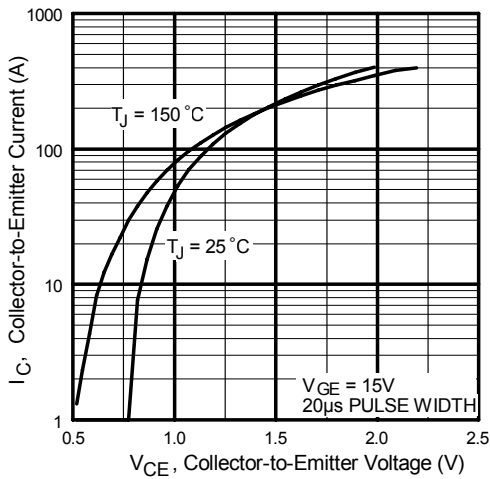


Fig. 2 - Typical Output Characteristics

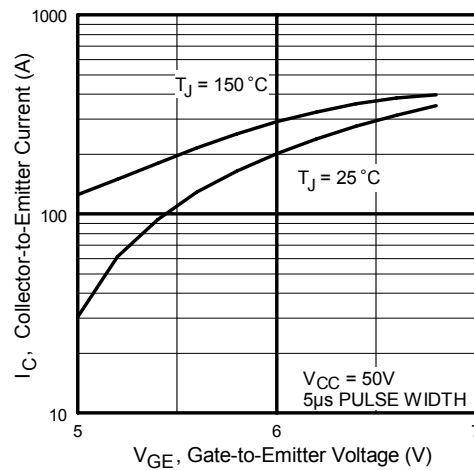


Fig. 3 - Typical Transfer Characteristics

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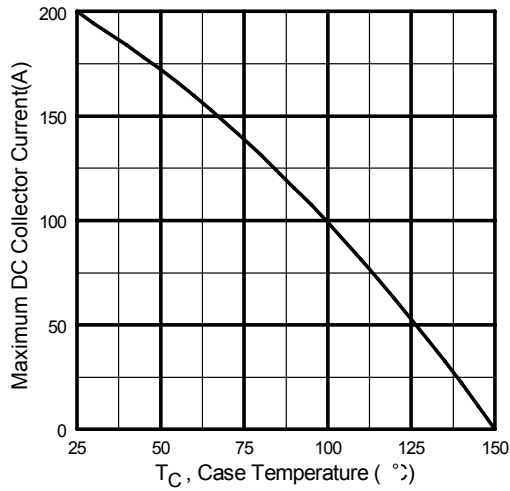


Fig. 4 - Maximum Collector Current vs. Case Temperature

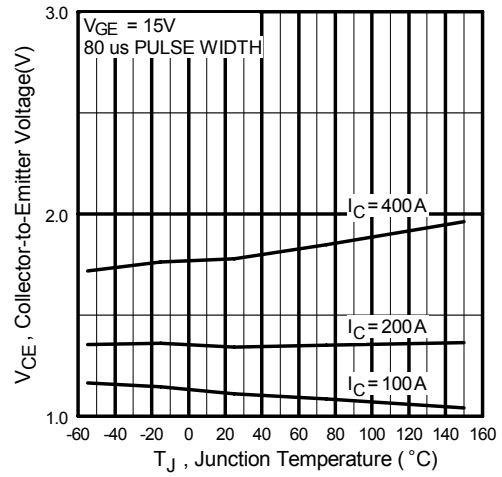


Fig. 5 - Typical Collector-to-Emitter Voltage vs. Junction Temperature

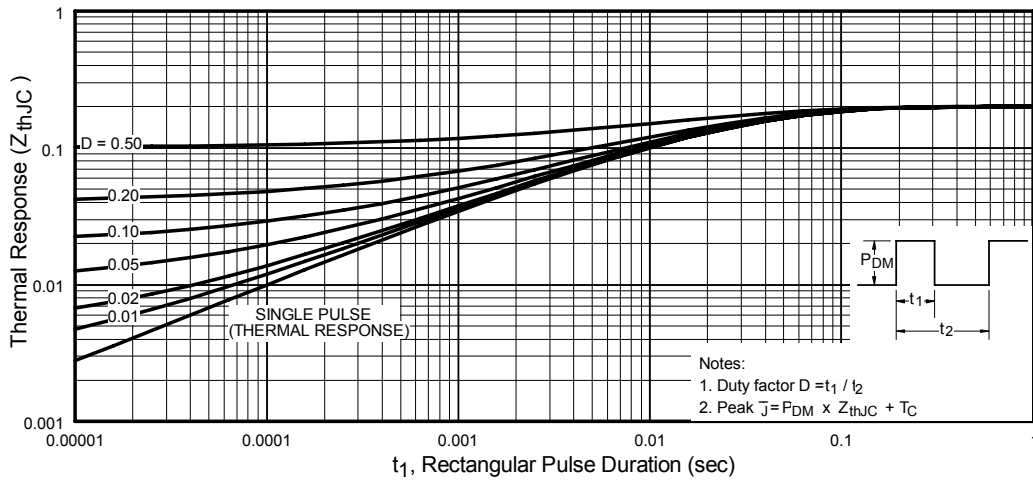


Fig. 6 - Maximum Effective Transient Thermal Impedance, Junction-to-Case

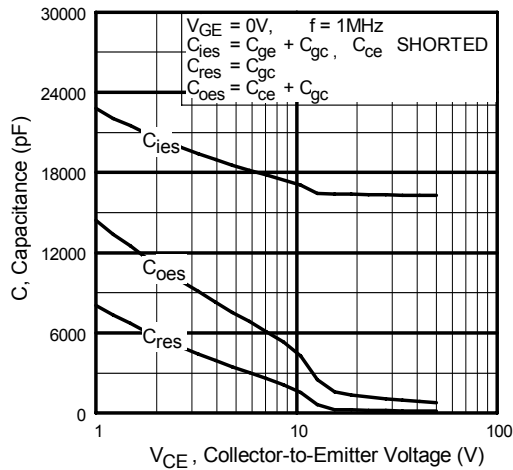


Fig. 7 - Typical Capacitance vs. Collector-to-Emitter Voltage

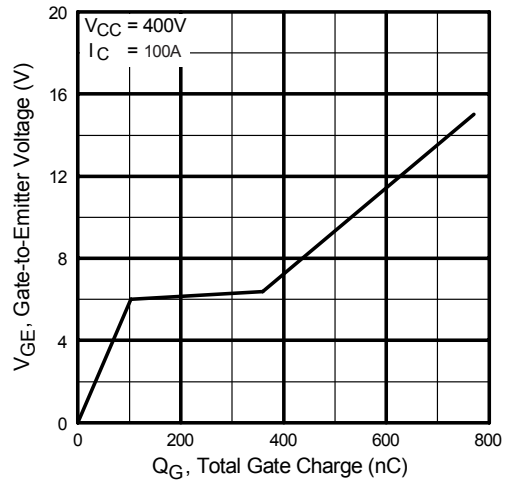


Fig. 8 - Typical Gate Charge vs. Gate-to-Emitter Voltage

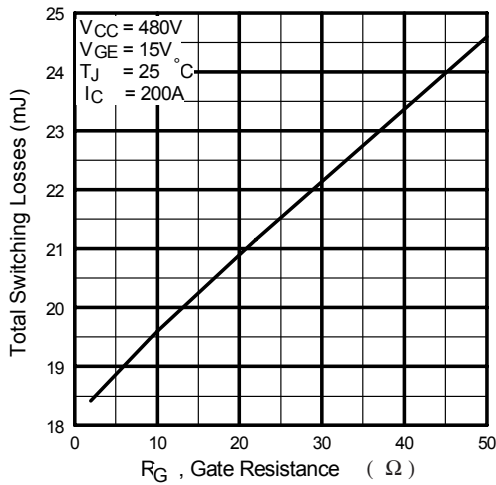


Fig. 9 - Typical Switching Losses vs. Gate Resistance

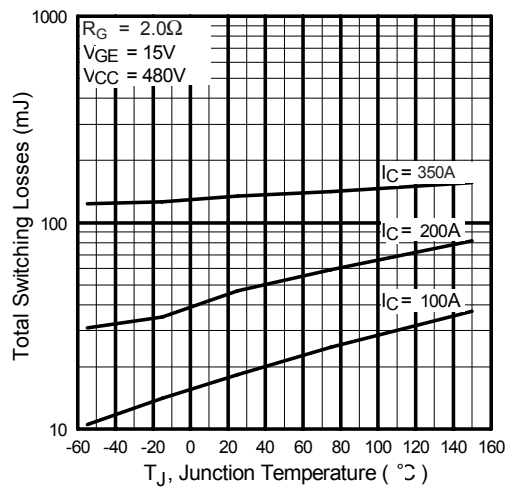


Fig. 10 - Typical Switching Losses vs. Junction Temperature

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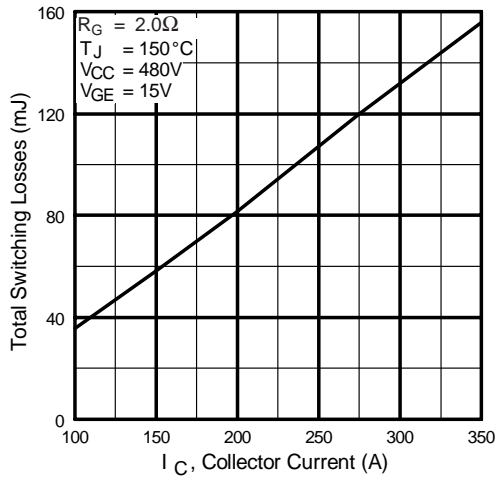


Fig. 11 - Typical Switching Losses vs. Collector Current

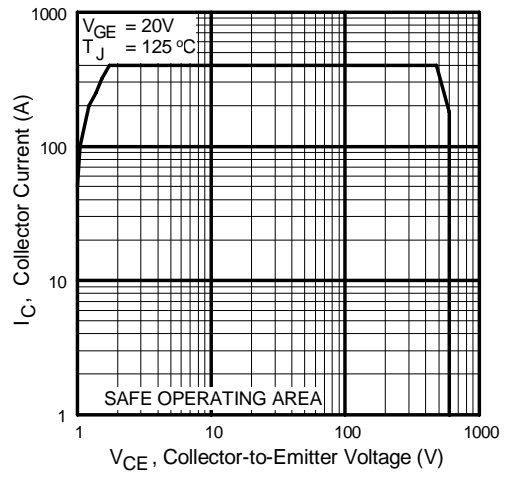
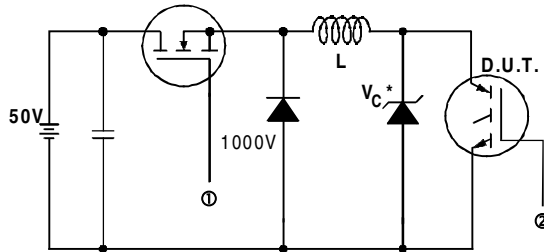


Fig. 12 - Turn-Off SOA



* Driver same type as D.U.T.; $V_c = 80\%$ of $V_{ce(max)}$
 * Note: Due to the 50V power supply, pulse width and inductor will increase to obtain rated I_d .

Fig. 13a - Clamped Inductive Load Test Circuit

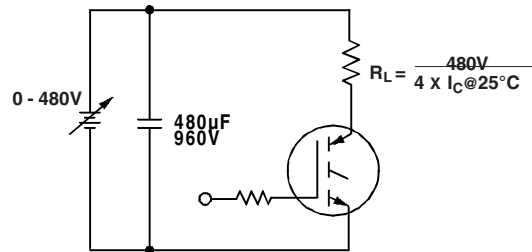


Fig. 13b - Pulsed Collector Current Test Circuit

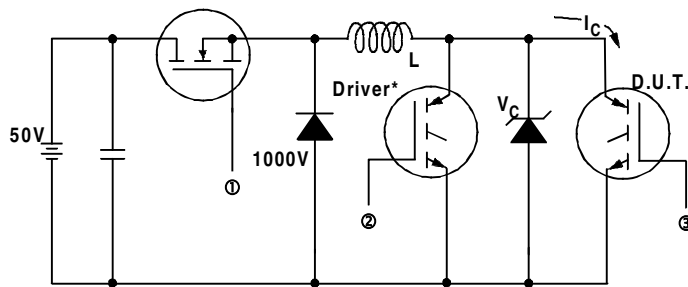


Fig. 14a - Switching Loss Test Circuit

* Driver same type as D.U.T., $V_C = 480V$

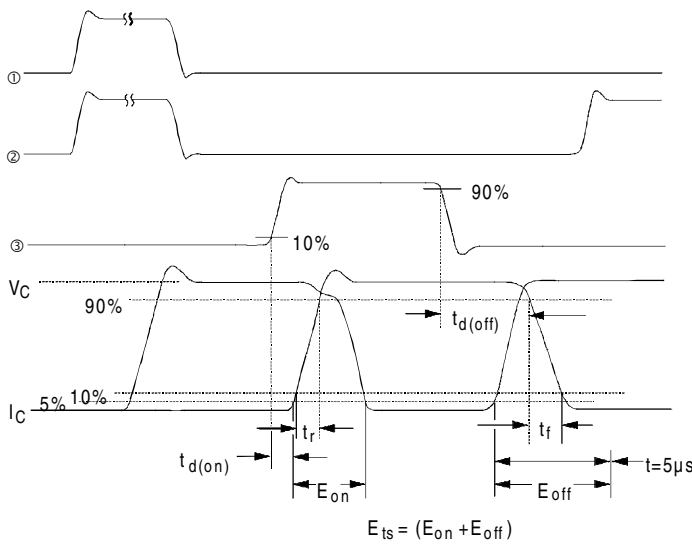


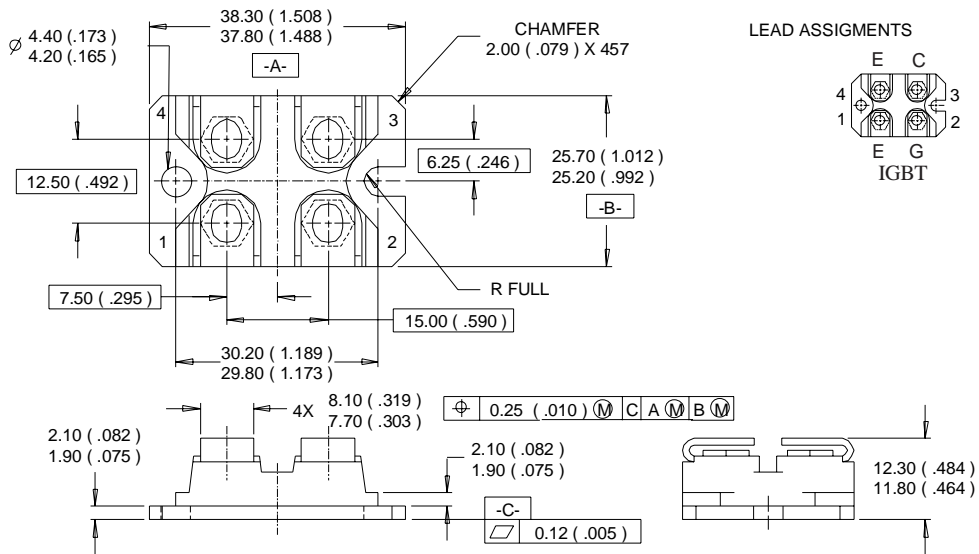
Fig. 14b - Switching Loss Waveforms

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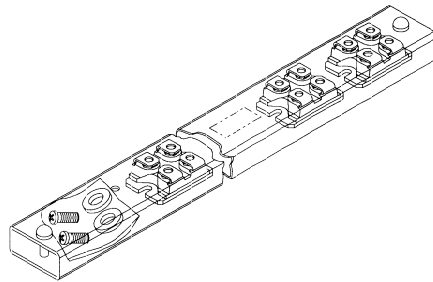
SOT-227 Package Details

Dimensions are shown in millimeters (inches)



Tube

QUANTITIES PER TUBE IS 10
M4 SREW AND WASHER INCLUDED



Ordering Information Table

Device Code							
G	A	200	S	A	60	S	P
①	②	③	④	⑤	⑥	⑦	⑧
1	-	Insulated Gate Bipolar Transistor (IGBT)					
2	-	Gen. 4, IGBT Siclon, DBC Construction					
3	-	Current Rating (200 = 200A)					
4	-	Single switch, no diode					
5	-	SOT-227					
6	-	Voltage Rating (60 = 600V)					
7	-	Speed/ Type (S = Standard Speed)					
8	-	• none = Standard Production • P = Lead-Free					

Data and specifications subject to change without notice.
This product has been designed for Industrial Level and Lead-Free.
Qualification Standards can be found on IR's Web site.