



## IGBT Module 1200V / 100A

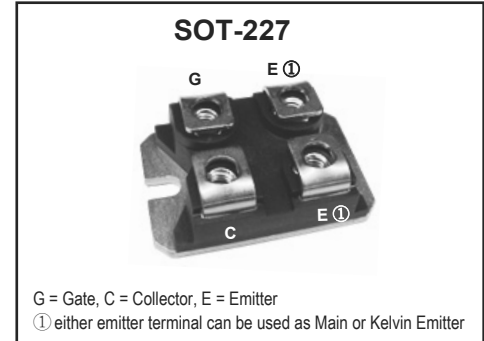
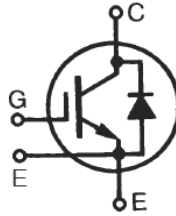
### Features

- ◆ Fast switching IGBT trench technology
- ◆ Low switching loss
- ◆ Superfast diodes
- ◆ High short circuit capability

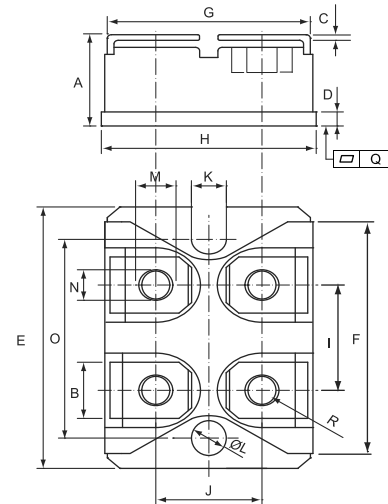
### Applications

- ◆ Welder / Power Supply
- ◆ UPS / Inverter
- ◆ Industrial Motor Drive

Preliminary



Dimensions in inches and (millimeters)



	DIMENSIONS			
	INCHES		MM	
	MIN	MAX	MIN	MAX
A	0.460	0.483	11.68	12.28
B	0.307	0.323	7.80	8.20
C	0.030	0.033	0.75	0.85
D	0.071	0.081	1.80	2.05
E	1.488	1.504	37.80	38.20
F	1.248	1.260	31.70	32.00
G	0.917	0.957	23.30	24.30
H	0.996	1.008	25.30	25.60
I	0.579	0.602	14.70	15.30
J	0.492	0.516	12.50	13.10
K	0.161	0.169	4.10	4.30
L	0.161	0.169	4.10	4.30
M	0.181	0.197	4.60	5.00
N	0.165	0.181	4.20	4.60
O	1.181	1.197	30.00	30.40
Q	-0.002	0.004	-0.05	0.10
R	M4*8			

### Maximum Ratings (T<sub>c</sub> = 25°C)

Item	Symbol	Rated Value	Unit
Collector-Emitter Voltage	V <sub>CES</sub>	1200	V
Gate-Emitter Voltage	V <sub>GES</sub>	±20	V
DC-Collector Current	T <sub>c</sub> = 80°C I <sub>C,nom.</sub>	100	A
Repetitive Peak Collector Current	tp = 1ms I <sub>CRM</sub>	200	A
Total Power Dissipation	P <sub>tot</sub>	0.78	kW
Isolation Voltag (e Terminal to Base, AC 1 min.)	V <sub>iso</sub>	2500	V
DC Forward Current	I <sub>F</sub>	100	A
Repetitive Peak Forward. Current	tp = 1ms I <sub>FRM</sub>	200	A
Junction Temperature Range	T <sub>J</sub>	-40 ~ +150	°C
Storage Temperature Range	T <sub>stg</sub>	-40 ~ +125	°C
Mounting Torque (M4 Screw)	M <sub>d</sub>	1.3	N.m



### ■ Electrical Characteristics ( $T_{VJ} = 25^{\circ}\text{C}$ )

Characteristic		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Cut-Off Current		$I_{CES}$	$V_{CE} = 1200\text{V}$ $V_{GE} = 0\text{V}$	-	10	500	$\mu\text{A}$
Gate-Emitter Leakage Current		$I_{GES}$	$V_{GE} = 20\text{V}$ $V_{CE} = 0\text{V}$	-	-	400	nA
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 100\text{A}$ , $V_{GE} = 15\text{V}$	-	2.6	3.2	V
Gate-Emitter Threshold Voltage		$V_{GE(th)}$	$V_{CE} = V_{GE}$ , $I_C = 4\text{mA}$	4.5	5.5	6.5	V
Input Capacitance		$C_{ies}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$	-	19	-	nF
Output Capacitance		$C_{oes}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$	-	0.39	-	nF
Reverse Transfer Capacitance		$C_{res}$	$V_{CE} = 25\text{V}$ , $V_{GE} = 0\text{V}$ , $f = 1\text{MHz}$	-	0.67	-	nF
Switching Time	Rise Time	$t_r$	$V_{CC} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 6.8\Omega$ $V_{GE} = \pm 15\text{V}$	-	0.06	-	$\mu\text{s}$
	Turn-On Time	$t_{d,on}$		-	0.09	-	
	Fall Time	$t_f$		-	0.03	-	
	Turn-Off Time	$t_{d,off}$		-	0.35	-	
Turn-on Energy Loss Per Pulse		$E_{on}$	$I_C = 100\text{A}$ , $V_{CC} = 600\text{V}$ $V_{GE} = 15\text{V}$ , $R_G = 6.8\Omega$	-	10	-	mJ
Turn-off Energy Loss Per Pulse		$E_{off}$	$T_{VJ} = 125^{\circ}\text{C}$ , $L_s = 60\text{nH}$	-	12	-	mJ
External Gate Resistance		$R_G$	Per Switch	4.7	-	10	$\Omega$

### ■ Free Wheeling Diode Ratings & Characteristics ( $T_{VJ} = 25^{\circ}\text{C}$ )

Characteristic		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Peak Forward Voltage		$V_F$	$I_F = 100\text{A}$ , $V_{GE} = 0\text{V}$	-	1.8	2.3	V
Peak Reverse Recovery Current		$I_{RM}$	$I_F = 100\text{A}$ , $-di_F/dt = 2700\text{A}/\mu\text{sec}$ $V_R = 600\text{V}$ , $V_{GE} = -15\text{V}$	-	125	-	A
Recovered Charge		$Q_r$	$I_F = 100\text{A}$ , $-di_F/dt = 2700\text{A}/\mu\text{sec}$ $V_R = 600\text{V}$ , $V_{GE} = -15\text{V}$	-	12	-	$\mu\text{C}$
Reverse Recovery Energy		$E_{rec}$	$I_F = 100\text{A}$ , $-di_F/dt = 2700\text{A}/\mu\text{sec}$ $V_R = 600\text{V}$ , $V_{GE} = -15\text{V}$ , $T_{vj} = 125^{\circ}\text{C}$	-	9	-	mJ

### ■ Thermal Characteristics ( $T_C = 25^{\circ}\text{C}$ )

Characteristic		Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Thermal Impedance	IGBT	$R_{th(j-c)}$	Junction to Case	-	-	0.18	$^{\circ}\text{C/W}$
	Diode			-	-	0.50	



Typical Characteristics

Preliminary Data

Fig.1 Output characteristic (Typical)

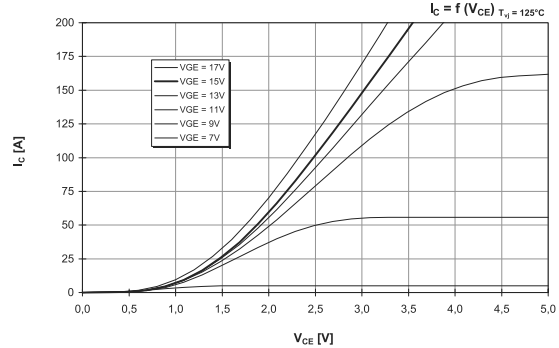
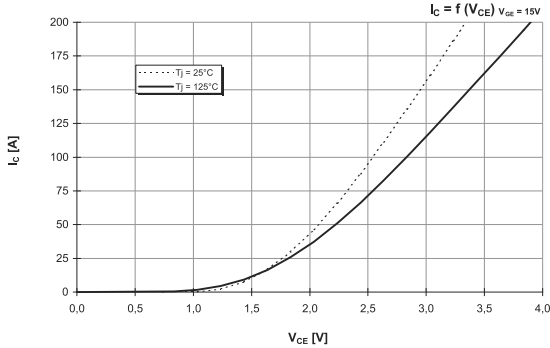


Fig.2 Transfer characteristic (Typical)

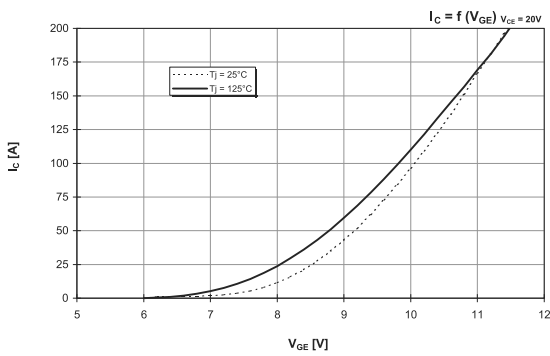


Fig.3 Forward characteristic of inverse diode (typical)

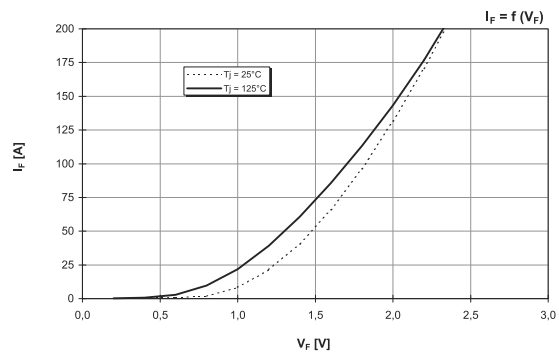


Fig.4 Switching losses (Typical)

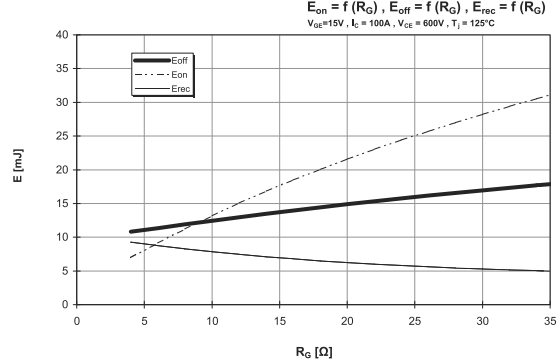
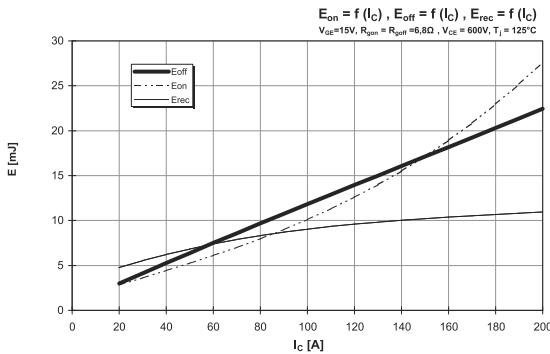
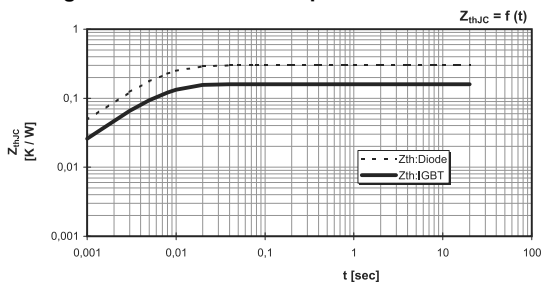
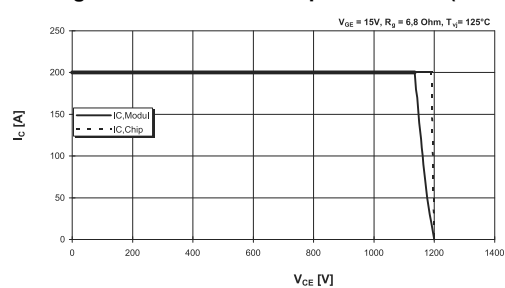


Fig.5 Transient thermal impedance



i	1	2	3	4
$r_i$ [K/kW] : IGBT	71.26	54.24	34.43	0.06
$\tau_i$ [sec] : IGBT	0.006	0.029	0.043	1.014
$r_i$ [K/kW] : Diode	81.89	122.02	63.19	32.9
$\tau_i$ [sec] : Diode	0.006	0.035	0.033	0.997

Fig.6 Reverse bias safe operation area (RBSOA)





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