



High-frequency switch IGBT Module 1200V / 100A

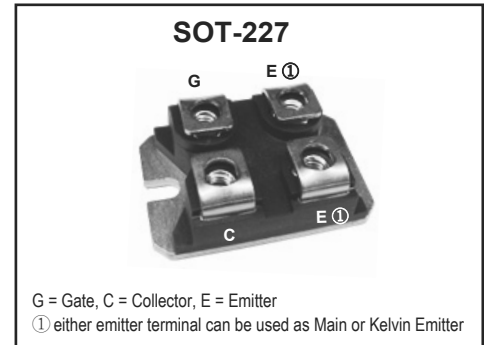
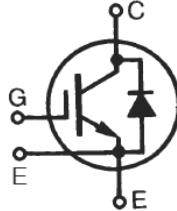
Features

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

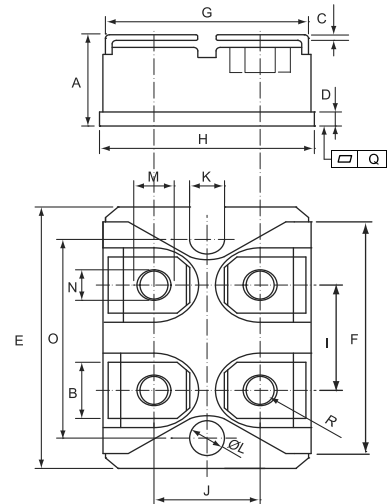
Applications

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

Preliminary



Dimensions in inches and (millimeters)



Maximum Ratings (T_c=25°C)

Item	Symbol	Rated Value	Unit
Collector-Emitter Voltage	V _{CES}	1200	V
Gate-Emitter Voltage	V _{GES}	±20	V
DC-Collector Current T _c = 80°C	I _{C,nom.}	100	A
Repetitive Peak Collector Current t _p = 1ms	I _{CRM}	200	A
Total Power Dissipation	P _{tot}	555	W
Isolation Voltage (e Terminal to Base, AC 1 min.)	V _{iso}	3000	V
DC Forward Current	I _F	100	A
Repetitive Peak Forward Current t _p = 1ms	I _{FRM}	200	A
Junction Temperature Range	T _J	-40~+150	°C
Storage Temperature Range	T _{stg}	-40~+125	°C
Mounting Torque		1.3	N.m
Weight		30.5	g

	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			



■ **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	μA
Gate-Emitter Leakage Current		I_{GES}	$V_{GE} = 20\text{V}$ $V_{CE} = 0\text{V}$	-	-	400	nA
Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	$I_C = 100\text{A}, V_{GE} = 15\text{V}$	-	1.9	2.2	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}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	15	-	nF
Output Capacitance		C_{oes}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	0.40	-	nF
Reverse Transfer Capacitance		C_{res}	$V_{CE} = 25\text{V}, V_{GE} = 0\text{V}, f = 1\text{MHz}$	-	0.26	-	nF
Switching Time	Rise Time	t_r	$V_{CC} = 600\text{V}$ $I_C = 100\text{A}$ $R_G = 1\Omega$ $V_{GE} = \pm 15\text{V}$	-	0.04	-	μs
	Turn-On Time	$t_{d,on}$		-	0.08	-	
	Fall Time	t_f		-	0.04	-	
	Turn-Off Time	$t_{d,off}$		-	0.32	-	
Turn-on Energy Loss Per Pulse		E_{on}	$I_C = 100\text{A}, V_{CC} = 600\text{V}$ $V_{GE} = 15\text{V}, R_G = 1\Omega$	-	0.9	-	mJ
Turn-off Energy Loss Per Pulse		E_{off}	Inductive load	-	6.2	-	mJ
External Gate Resistance		R_G	Per Switch	4.7	-	10	Ω
Internal Gate Resistance		R_G		4.7			Ω

■ **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}	$I_F = 100\text{A}, R_G = 1\Omega$ $V_R = 600\text{V}, V_{GE} = -15\text{V}$	-	67	-	A
Recovered Charge		Q_r	$I_F = 100\text{A}, R_G = 1\Omega$ $V_R = 600\text{V}, V_{GE} = -15\text{V}$	-	5.0	-	μC
Reverse Recovery Energy		E_{rec}	$I_F = 100\text{A}, R_G = 1\Omega$ $V_R = 600\text{V}, V_{GE} = -15\text{V}$	-	3.29	-	mJ
Reverse Recovery Time		T_{rr}	$I_F = 100\text{A}, R_G = 1\Omega$ $V_R = 300\text{V}, V_{GE} = -15\text{V}$	-	98	-	ns

■ **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	-	-	0.25	$^{\circ}\text{C/W}$
	Diode			-	-	0.48	



Typical Characteristics

Preliminary Data

Fig.1 Output characteristic (Typical)

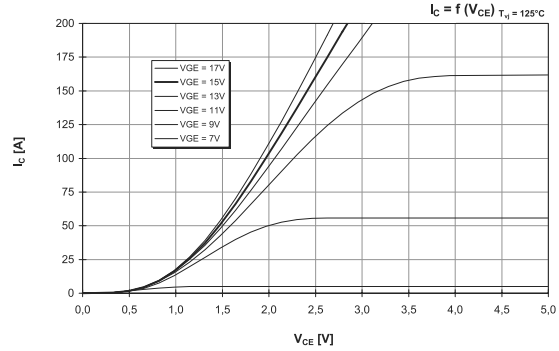
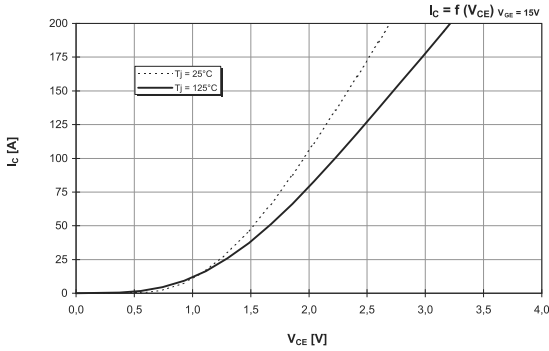


Fig.2 Transfer characteristic (Typical)

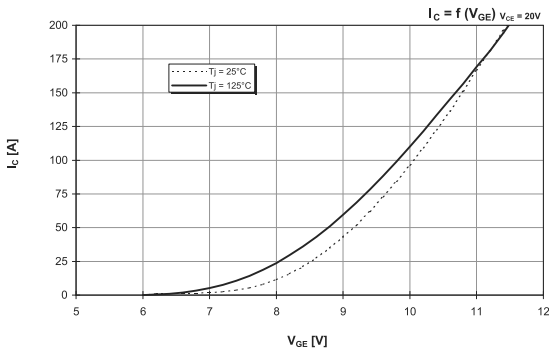


Fig.3 Forward characteristic of inverse diode (typical)

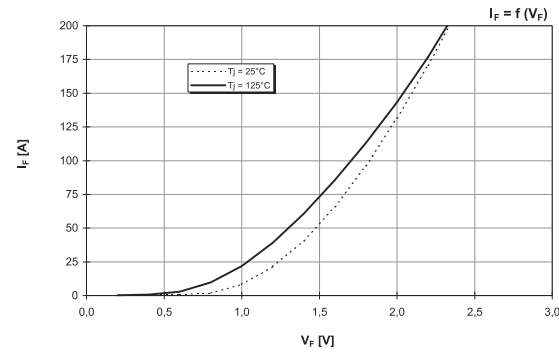


Fig.4 Switching losses (Typical)

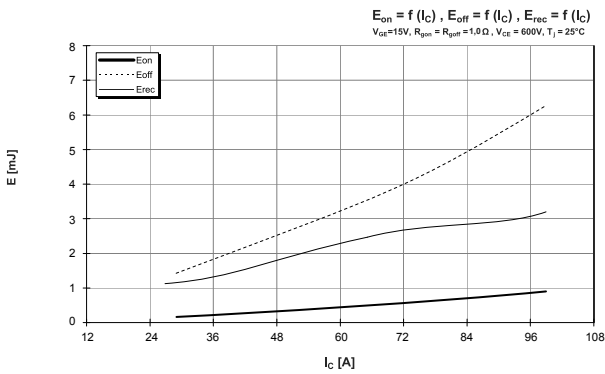


Fig.5 Switching losses IGBT, Inverter (typical)

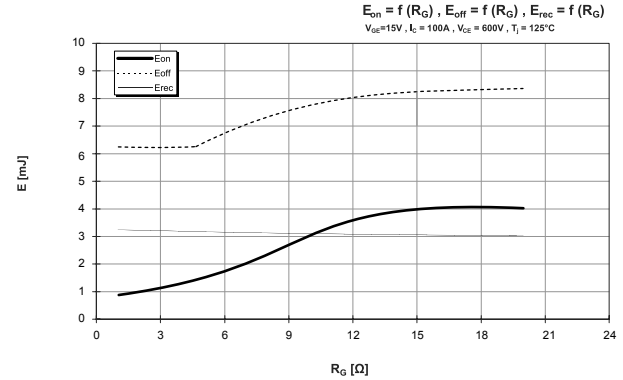
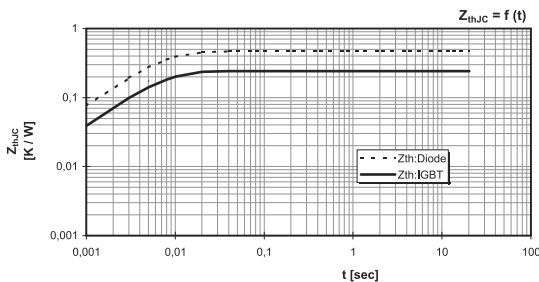
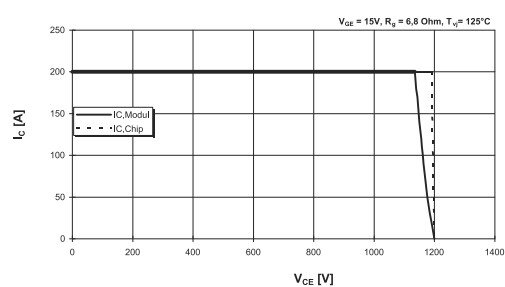


Fig.6 Transient thermal impedance



i	1	2	3	4
r_{θ} [K/kW] : IGBT	71.26	54.24	34.43	0.06
τ_i [sec] : IGBT	0.006	0.029	0.043	1.014
r_{θ} [K/kW] : Diode	81.89	122.02	63.19	32.9
τ_i [sec] : Diode	0.006	0.035	0.033	0.997

Fig.7 Reverse bias safe operation area (RBSOA)





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