

SF200R12E6



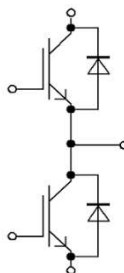
62mm module with IGBT and Diode

Features:

- 1200V Trench & Field stop technology
- Low switching losses
- Positive temperature coefficient

Applications:

- Motor Drives
- UPS
- High Frequency Switching Application



$V_{CES} = 1200V$, $I_{C\ nom} = 200A$ / $I_{CRM} = 400A$

IGBT, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	$T_{vj}=25^{\circ}C$	V_{CES}	1200	V
Continuous DC collector current	$T_C=100^{\circ}C$, $T_{vj\ max}=175^{\circ}C$	$I_{C\ nom}$	200	A
Repetitive peak collector current	$t_p=1\ ms$	I_{CRM}	400	A
Total power dissipation	$T_C = 25^{\circ}C$, $T_{vj\ max} = 150^{\circ}C$	P_{tot}	1071	W
Gate emitter voltage		V_{GE}	± 20	V

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Collector-Emitter saturation voltage	$V_{GE}=15V$, $I_C=200A$	V_{CESat}		2.07		V
	$V_{GE}=15V$, $I_C=200A$			2.56		
	$V_{GE}=15V$, $I_C=200A$			2.77		
Gate-Emitter threshold voltage	$I_C=3.2mA$, $V_{GE}=V_{CE}$	$T_{vj}=25^{\circ}C$	$V_{GE(th)}$	5.7		
Gate charge	$V_{GE}=-15V \dots +15V$		Q_G	1.11		μC
Internal gate resistor			R_{Gint}	3.68		Ω
Input capacitance	$f=1\ MHz$, $V_{CE}=25\ V$, $V_{GE}=0\ V$	$T_{vj}=25^{\circ}C$	C_{ies}	14.76		nF
Output capacitance			C_{oes}	1.38		
Reverse transfer capacitance			C_{res}	79.11		

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Collector-emitter cut-off current	$V_{CE}=1200V, V_{GE}=0V$	$T_{vj}=25^{\circ}C$	I_{CES}			5	mA
Gate-emitter leakage current	$V_{CE}=0V, V_{GE}=20V$	$T_{vj}=25^{\circ}C$	I_{GES}			400	nA
Turn-on delay time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_{d\ on}$			167.3	
		$T_{vj}=125^{\circ}C$				189.3	
		$T_{vj}=150^{\circ}C$				193.4	
Rise time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_r			49.5	
		$T_{vj}=125^{\circ}C$				54.4	
		$T_{vj}=150^{\circ}C$				56.1	
Turn-off delay time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	$t_{d\ off}$			250.0	ns
		$T_{vj}=125^{\circ}C$				296.6	
		$T_{vj}=150^{\circ}C$				294.4	
Fall time	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	t_f			213.6	
		$T_{vj}=125^{\circ}C$				224.2	
		$T_{vj}=150^{\circ}C$				244.8	
Turn-on energy loss per pulse	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	E_{on}			11.44	mJ
		$T_{vj}=125^{\circ}C$				18.58	
		$T_{vj}=150^{\circ}C$				21.78	
Turn-off energy loss per pulse	$I_C=200A, V_{CE}=600V$ $V_{GE}=\pm 15V, R_G=2.5\Omega$ (inductive load)	$T_{vj}=25^{\circ}C$	E_{off}			16.24	
		$T_{vj}=125^{\circ}C$				18.59	
		$T_{vj}=150^{\circ}C$				19.67	
SC data	$V_{GE}\leq 15V, V_{ce}=800V$ $V_{CEmax}=V_{CES}-L_{sCE}\cdot di/dt$	$t_p\leq 10\mu s, T_{vj}=150^{\circ}C$	I_{sc}			677	A
Thermal resistance, junction to case	per IGBT		R_{thJC}			0.14	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	$^{\circ}C$

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	$T_{vj}=25^{\circ}C$	V_{RRM}	1200	V
Continuous DC forward current		I_F	200	A
Repetitive peak forward current	$t_p=1ms$	I_{FRM}	400	A

Characteristic Values

Parameter	Conditions	Symbol	Value			Unit
			Min.	Typ.	Max.	
Forward voltage	$I_F=200A, V_{GE}=0V$	V_F				2.25
	$I_F=200A, V_{GE}=0V$					2.30
	$I_F=200A, V_{GE}=0V$					2.45
Peak reverse recovery current	$I_F=200A,$	I_{RM}				96
	$-di_F/dt=2700A/\mu s(T_{vj}=150^{\circ}C)$					110
	$V_R=600V, V_{GE}=-15V$					115

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Recovered charge	$I_F=200A$, $-di_F/dt=2700A/\mu s(T_{vj}=150^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	Q_r	15.2 22.8 30.7		μC
Reverse recovered energy	$I_F=200A$, $-di_F/dt=2700A/\mu s(T_{vj}=150^\circ C)$ $V_R=600V, V_{GE}=-15V$	$T_{vj}=25^\circ C$ $T_{vj}=125^\circ C$ $T_{vj}=150^\circ C$	E_{rec}	6.80 9.00 12.30		mJ
Thermal resistance, junction to case	Per diode		R_{thjc}		0.2	K/W

Module

Isolation test voltage	RMS, $f = 50Hz$, $t = 1min$	V_{ISOL}	4	kV
Material module baseplate			Cu	
Mounting torque for modul mounting	to heat sink M6	M	3~6	Nm
Terminal connection torque	to terminals M6	M	2.5~5	Nm

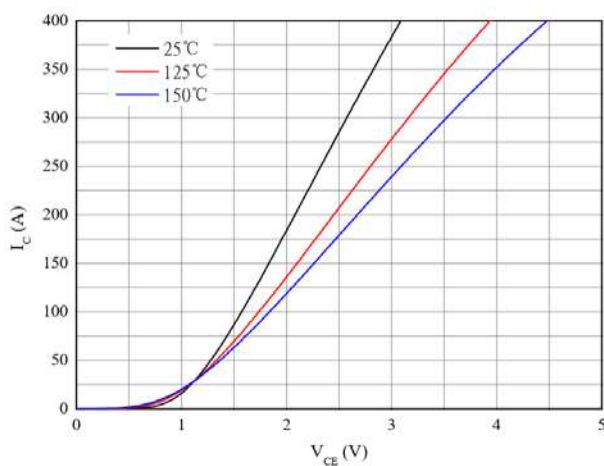


Figure 1. Typical output characteristics ($V_{GE}=15V$)

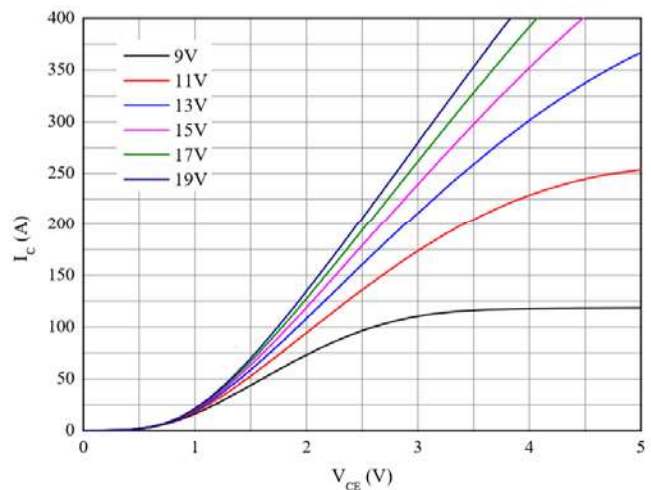
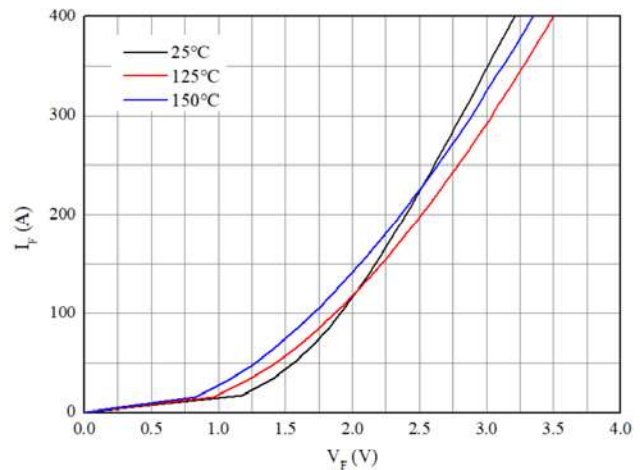
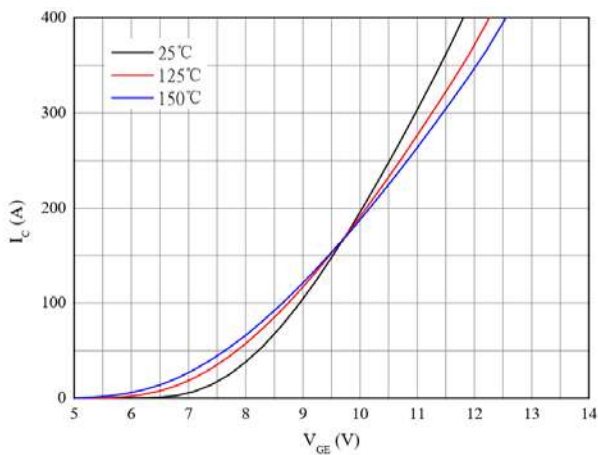


Figure 2. Typical output characteristics ($T_{vj}=150^\circ C$)



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Figure 3. Typical transfer characteristic($V_{CE}=20V$)

Figure 4. Forward characteristic of Diode

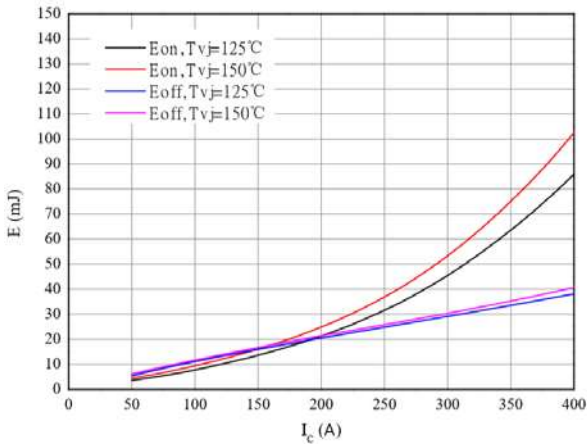


Figure 5. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $R_{Gon}=2.7\Omega$, $R_{Goff}=2.7\Omega$, $V_{CE}=600V$

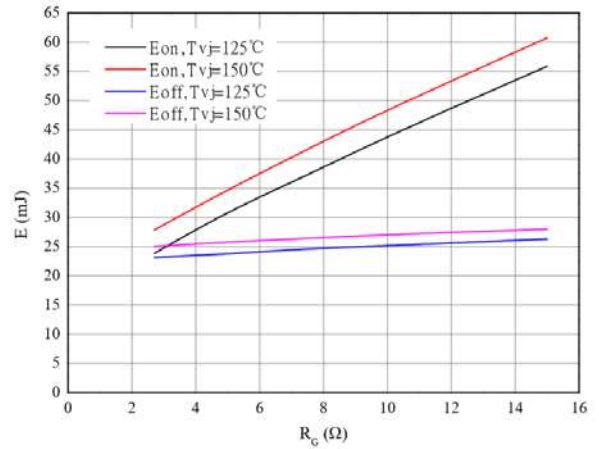


Figure 6. Switching losses of IGBT
 $V_{GE}=\pm 15V$, $I_C=200A$, $V_{CE}=600V$

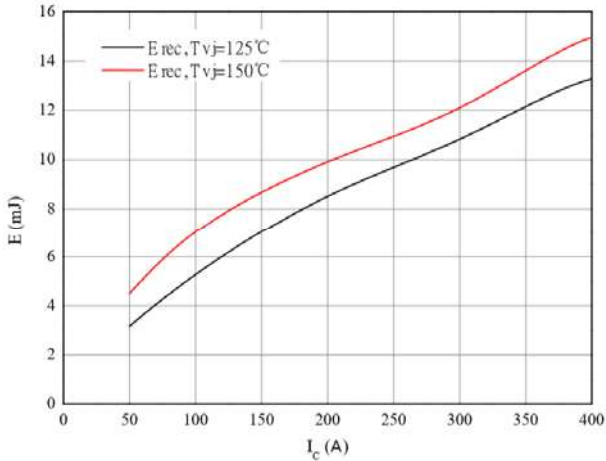


Figure 7. Switching losses of Diode
 $R_{Gon}=2.5\Omega$, $V_{CE}=600V$

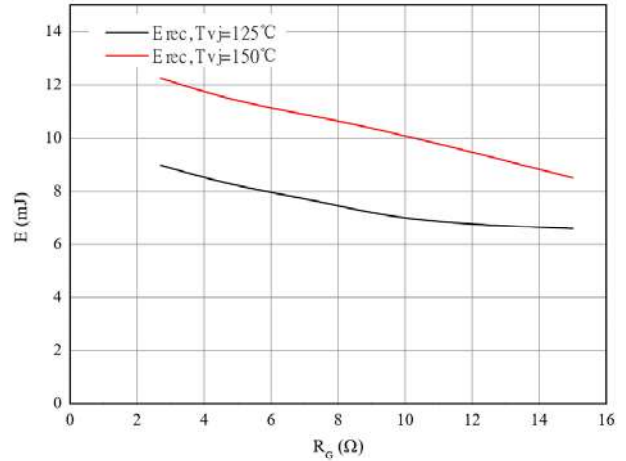


Figure 8. Switching losses of Diode
 $I_F=200A$, $V_{CE}=600V$

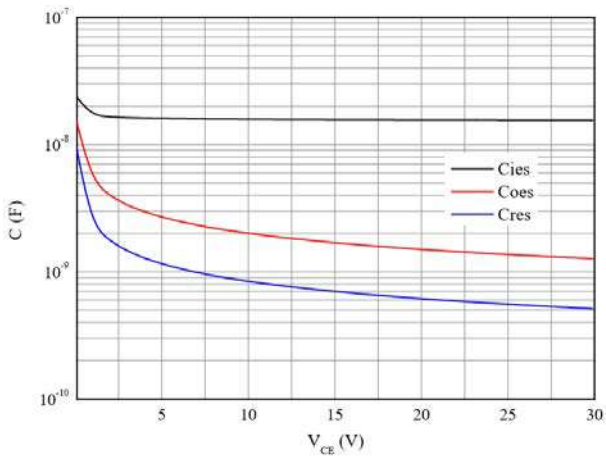
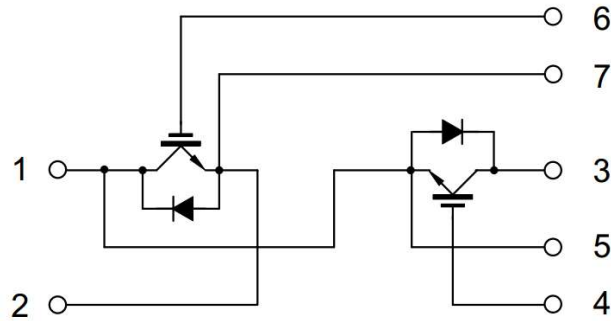


Figure 9. Capacitance characteristic

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Circuit diagram



Package outlines

