SF450R12E6

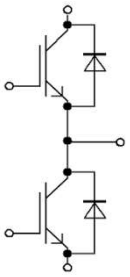
62mm Module with IGBT and Diode

Features:

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

Applications:

- Motor Drives
- UPS



IGBT, Inverter

V_{CES} = 1200V，$I_{C\ nom}$ = 450A / I_{CRM} =900A

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Collector-Emitter voltage	T_{vj}=25°C	V_{CES}	1200	V
Continuous DC collector current	T_C=100°C, $T_{vj\ max}$=175°C	$I_{C\ nom}$	450	A
Repetitive peak collector current	t_P=1 ms	I_{CRM}	900	A
Total power dissipation	T_C = 25°C, Tvj max = 175°C	Ptot	2307	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=450A V_{GE}=15V, I_C=450A V_{GE}=15V, I_C=450A	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_{CEsat}		2.15 2.72 2.86		V
Gate-Emitter threshold voltage	I_C=17mA, V_{GE}= V_{CE}	T_{vj}=25°C	$V_{GE(th)}$	5.2	5.8	6.4	
Gate charge	V_{GE}=-15V…+15V		Q_G		2.2		µC
Internal gate resistor			R_{Gint}		1.86		Ω
Input capacitance	f=1 MHz, V_{CE}=25 V, V_{GE}=0 V	T_{vj}=25°C	C_{ies}		31.1		nF
Output capacitance			C_{oes}		2.5		
Reverse transfer capacitance			C_{res}		1.1		nF
Collector-emitter cut-off current	V_{CE}=1200V , V_{GE}= 0 V	T_{vj}=25°C	I_{CES}			1	mA

Gate-emitter leakage current	V_{CE}=0 V, V_{GE}= 20 V	T_{vj}=25°C	I_{GES}			100	nA
Turn-on delay time	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ on}$		160 180 185		ns
Rise time	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_r		60 65 70		
Turn-off delay time	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	$t_{d\ off}$		270 300 310		
Fall time	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	t_f		200 210 250		
Turn-on energy loss per pulse	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{on}		16.7 28.6 35.9		mJ
Turn-off energy loss per pulse	I_C=450 A, V_{CE}=600 V V_{GE}=±15 V, R_G=1Ω (inductive load)	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{off}		40.9 44.7 48.3		
SC data	V_{GE}≤15V, Vcc=800V V_{CEmax}=V_{CES}-L_{sCE}·di/dt	t_P≤10us, T_{vj}=125°C	I_{SC}		1600		A
Thermal resistance, junction to case	per IGBT		R_{thJC}			0.065	K/W
Temperature under switching conditions			$T_{vj\ op}$	-40		150	°C

Diode, Inverter

Maximum Ratings

Parameter	Conditions	Symbol	Value	Unit
Repetitive peak reverse voltage	T_{vj}=25ºC	V_{RRM}	1200	V
Continuous DC forward current		I_F	450	A
Repetitive peak forward current	t_p=1ms	I_{FRM}	900	A

Characteristic Values

Parameter	Conditions		Symbol	Value			Unit
				Min.	Typ.	Max.	
Forward voltage	I_F=450A, V_{GE}=0V I_F=450A, V_{GE}=0V I_F=450A, V_{GE}=0V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	V_F		2.38 2.55 2.47		V
Peak reverse recovery current	I_F=450A -di_F/dt=5300A/μs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	I_{RM}		285 315 325		A

Recovered charge	I_F=450A -di$_F$/dt=5300A/μs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	Q_r		29.0 42.0 60.0		μC
Reverse recovered energy	I_F=450A -di$_F$/dt=5300A/μs(T_{vj}=150°C) V_R=600V, V_{GE}=-15V	T_{vj}=25°C T_{vj}=125°C T_{vj}=150°C	E_{rec}		15.0 20.0 27.0		mJ
Thermal resistance, junction to case	Per diode		R_{thjc}			0.11	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

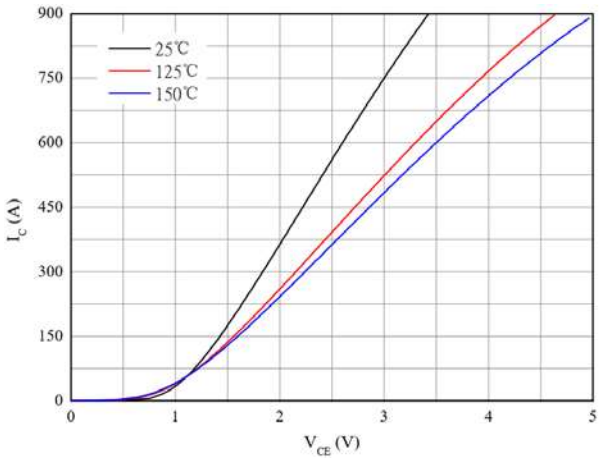


Figure 1. Typical output characteristics (V_{GE}=15V)

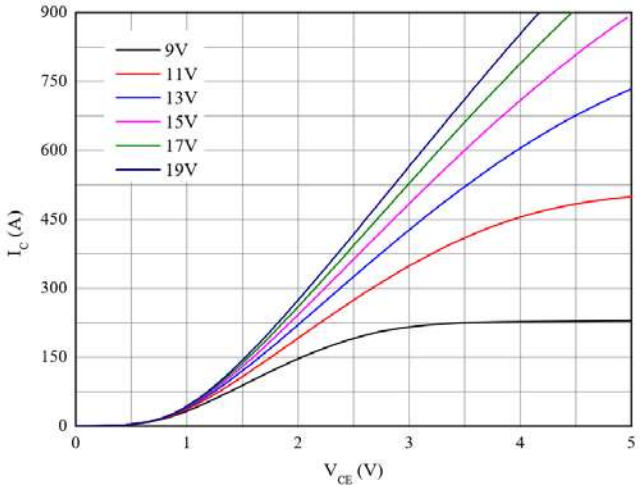


Figure 2. Typical output characteristics (T_{vj}=150℃)

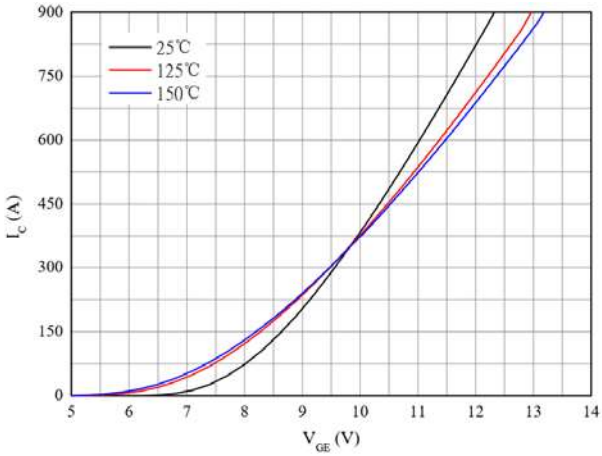


Figure 3. Typical transfer characteristic(V_{CE}=20V)

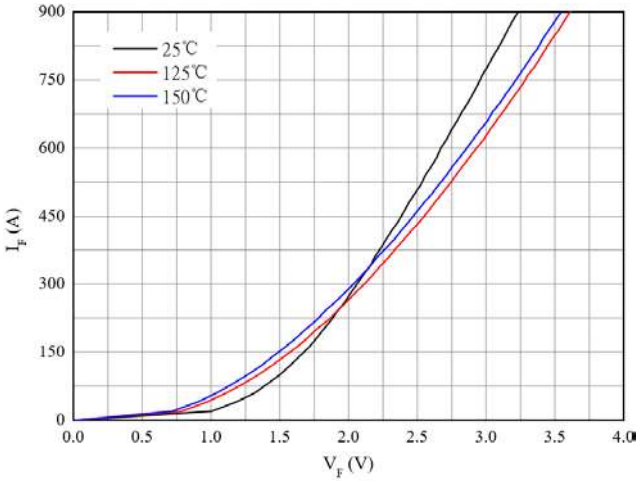


Figure 4. Forward characteristic of Diode

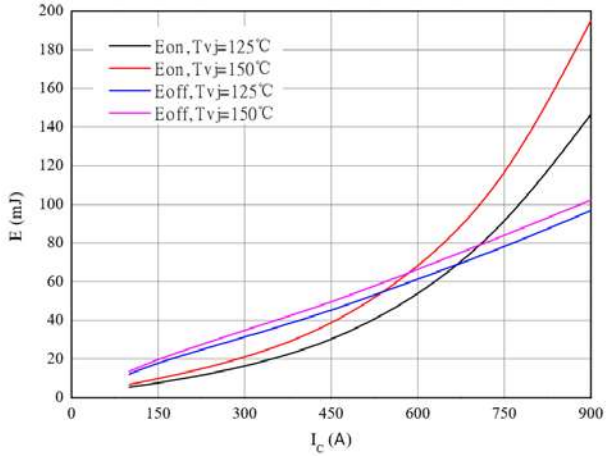


Figure 5. Switching losses of IGBT
V_{GE}=±15V, R_{Gon}=1Ω, R_{Goff}=1Ω, V_{CE}=600V

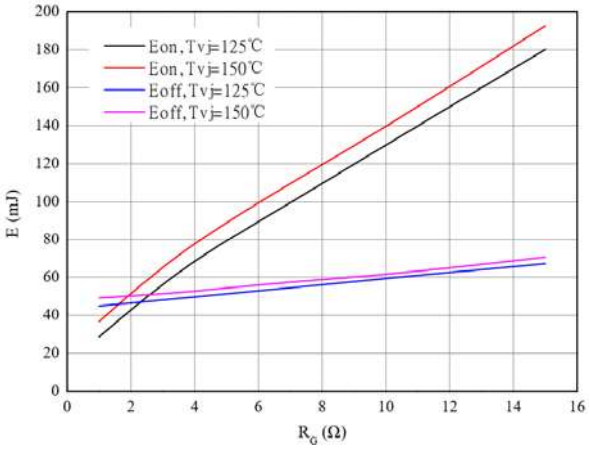


Figure 6. Switching losses of IGBT
V_{GE}=±15V, I_C=450A, V_{CE}=600V

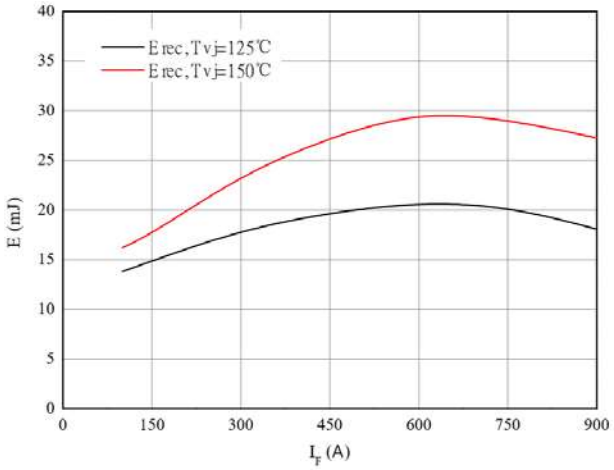


Figure 7. Switching losses of Diode
R_{Gon}=1Ω, V_{CE}=600V

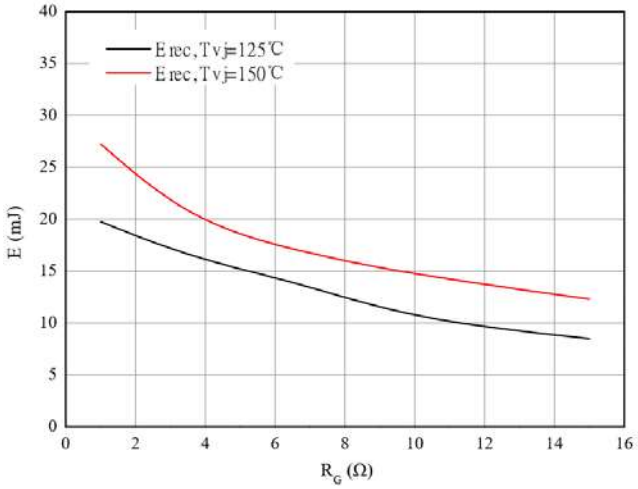


Figure 8. Switching losses of Diode
IF=450A, V_{CE}=600V

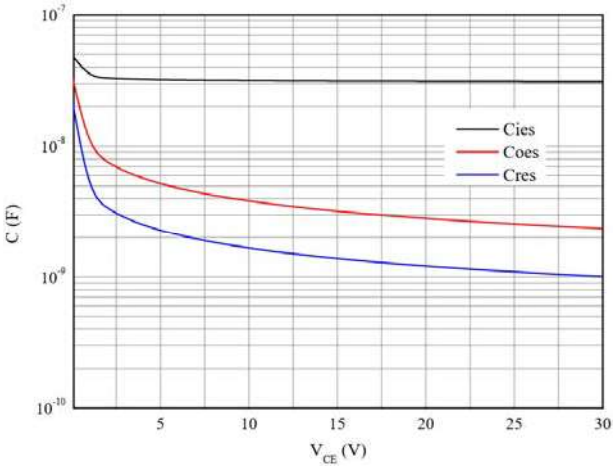
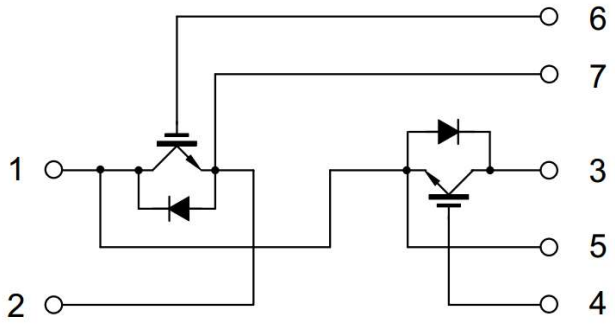


Figure 9. Capacitance characteristic

SF450R12E6

Circuit diagram



Package outlines