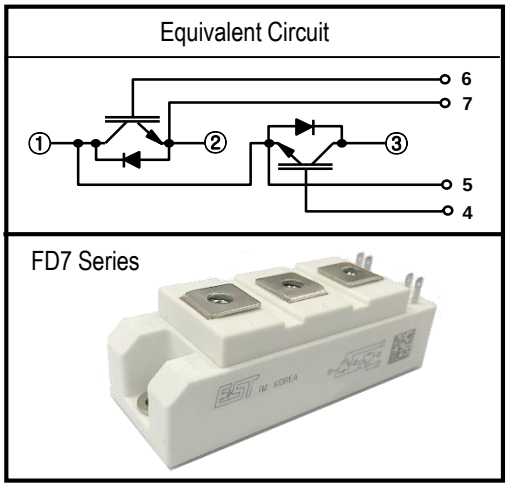
ESJ150SH120K

Trench/Fieldstop IGBT module

Equivalent Circuit and Package



Please see the package out line information

Features

- $V_{CE(sat)}$ = 2.4V
- BV_{CES} = 1250V
- Fast & Soft Anti-Parallel FWD
- Short circuit rated : Min. 10uS at T_C=100℃
- Reduced EMI and RFI
- Isolation Type Package

Applications

- Welding Machine
- Induction Heating
- UPS Systems
- Motor Drives

Absolute Maximum Ratings @ T_j=25℃(Per Leg)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	-	1250	V
V_{GES}	Gate-emitter peak voltage	-	±20	V
I_C	DC-collector current	T_C = 25℃	300	A
		T_C = 80℃	150	A
I_{CM}(1)	Repetitive peak collector current	1ms	300	A
I_F	Diode continuous forward current	T_C = 80℃	150	A
I_{FM}	Diode repetitive peak forward current	-	300	A
T_J(2)	Operating junction temperature	-	-40 ~ 125	℃
T_{stg}	Storage temperature range	-	-40 ~ 125	℃
V_{ISO}	Insulation test voltage	60Hz, t=1min I_{ISOL}=1mA	2.5	kV
M_S	Mounting screw torque	M6	3.0 ~ 6.0	N.m
M_t	Mounting terminals screw torque	M5	2.5 ~ 5.0	N.m

(Note *2) The maximum junction temperature of chip is 150℃

■ Electrical Characteristics of IGBT @ T_j=25℃ (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	C-E Breakdown Voltage	V_{GE} = 0V , I_C = 100uA	1250	-	-	V
$V_{GE(th)}$	G-E threshold voltage	I_C = 1mA, V_{CE} = V_{GE}	4.8	-	6.8	V
I_{CES}	Zero gate voltage collector current	V_{GE} = 0V, V_{CE} = 1250V	-	-	100	uA
I_{GES}	G-E leakage current	V_{GE} = ±20V, V_{CE} = 0V	-	-	±0.5	μA
R_{Gint}	Internal Gate Resistor	-	-	3.5	-	Ω
$V_{CE(Sat)}$	C-E saturation voltage	I_C = 150A, V_{GE} = 15V, T_J = 25℃	-	2.4	2.8	V
		I_C = 150A, V_{GE} = 15V, T_J = 125℃	-	2.7	-	V
C_{ies}	Input capacitance	V_{GE} = 0V, f = 1MHz, V_{CE} = 25V	-	8670	-	pF
C_{oes}	Output capacitance		-	870	-	
C_{res}	Reverse transfer capacitance		-	770	-	
td(on)	Turn-on delay time	V_{CE} = 600V, I_C = 150A, V_{GE} = ±15V, R_G = 7.5Ω, T_J = 25℃, Inductive load	-	160	-	ns
tr	Turn-on rise time		-	105	-	
td(off)	Turn-off delay time		-	480	-	
tf	Turn-off fall time		-	45	-	
E_{on}	Turn-on Energy loss		-	21	-	mJ
E_{off}	Turn-off Energy loss		-	7.5	-	
td(on)	Turn-on delay time	V_{CE} = 600V, I_C = 150A, V_{GE} = ±15V, R_G = 7.5Ω, T_J= 125℃, Inductive load	-	180	-	ns
tr	Turn-on rise time		-	115	-	
td(off)	Turn-off delay time		-	520	-	
tf	Turn-off fall time		-	45	-	
E_{on}	Turn-on Energy loss		-	22	-	mJ
E_{off}	Turn-off Energy loss		-	8.5	-	
T_{sc}	Short Circuit Withstand Time	V_{CC} = 600V, V_{GE} = 15V, @T_c = 100℃	10	-	-	μs
Q_g	Total gate charge	V_{GE} = ±15V, V_{CE} = 600V, I_C = 150A	-	805	-	nC

■ Electrical Characteristics of FRD @ T_j=25℃ (unless otherwise specified)

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	I_F=150A	T_J =25℃	-	2.3	2.9	V
			T_J =125℃	-	2.3		
t_{rr}	Diode Reverse Recovery Time	I_F=150A, V_R=600V di/dt= -1300A/uS	T_J =25℃	-	220		ns
			T_J =125℃	-	250		
I_{rr}	Diode Peak Reverse Recovery Current		T_J =25℃	-	90		A
			T_J =125℃	-	100		
Q_{rr}	G-E leakage current		T_J =25℃	-	9900		nC
			T_J =125℃	-	12500		

■ Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case	per IGBT	-	-	0.20	℃/W
$R_{\theta JC}$	Junction-to-Case	per DIODE	-	-	0.45	℃/W
$R_{\theta CK}$	Case-to-Heatsink (Conductive grease applied)	per IGBT	0.05	-	-	℃/W
Weight	Weight of Module		-	-	160	g

■ Performance Curves

Fig. 1 Typical IGBT output characteristics(T_J = 25℃)

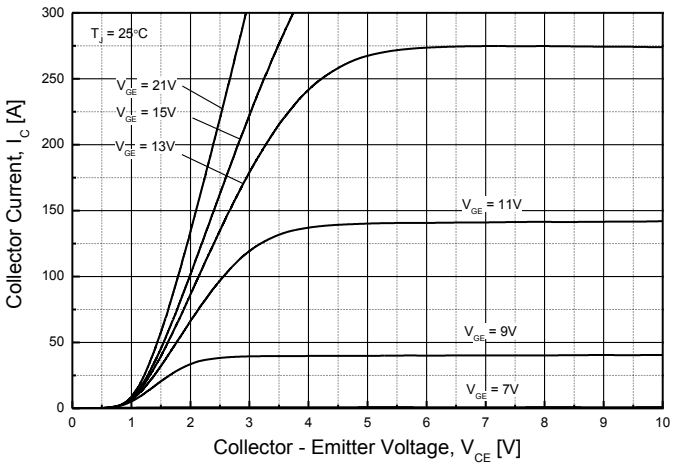


Fig. 2 Typical IGBT output characteristics(T_J = 125℃)

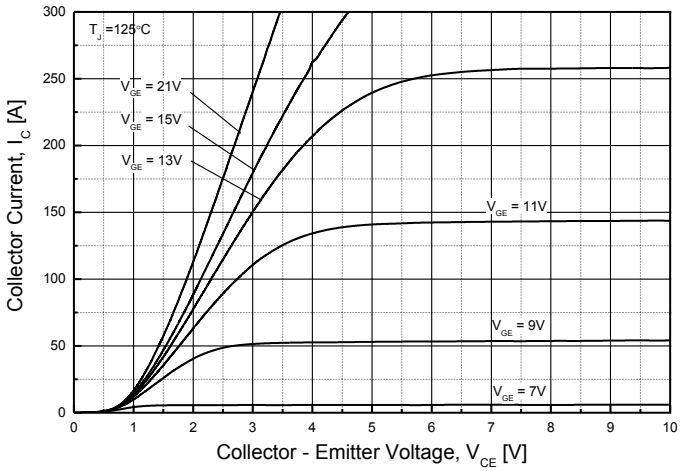


Fig. 3 Typical IGBT output characteristics

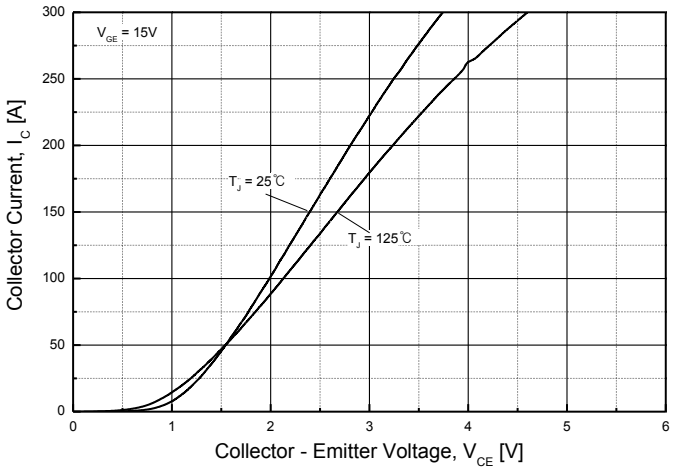


Fig. 4 Typical diode forward characteristics

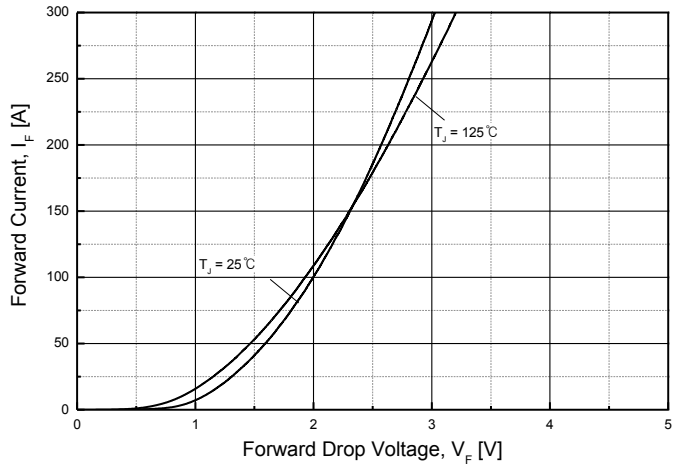


Fig. 5 Typical Switching Energy Loss =f(R_G)
V_{GE}=±15V, I_C=150A, V_{CE}=600V, T_J=25℃

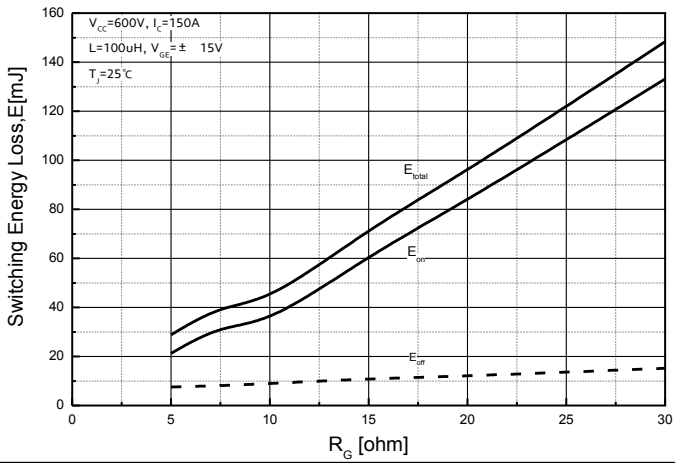
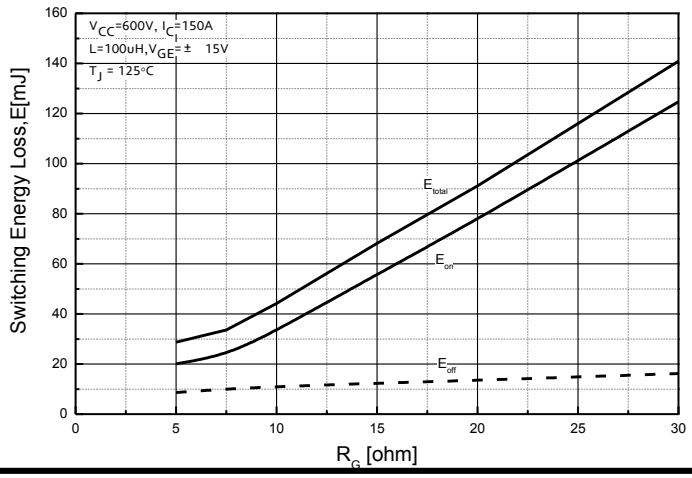


Fig. 6 Typical Switching Energy Loss =f(R_G)
V_{GE}=±15V, I_C=150A, V_{CE}=600V, T_J=125℃



■ Performance Curves

Fig. 7 Typical Switching Energy Loss =f(Ic)
V_{GE}=±15V, R_G=7.5Ω, V_{CE}=600V, T_j=25℃

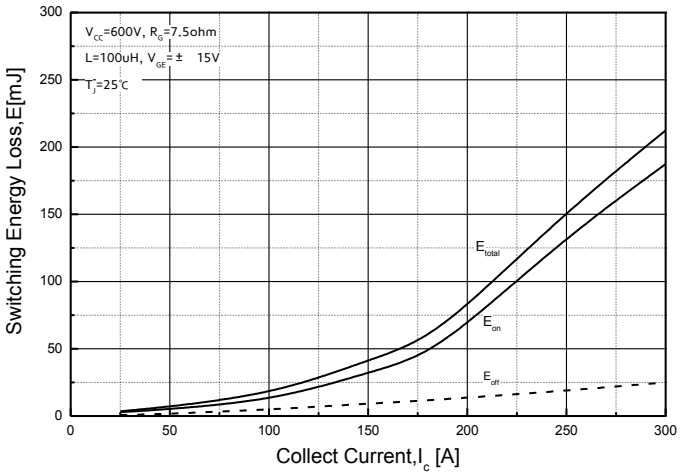


Fig. 8 Typical Switching Energy Loss =f(Ic)
V_{GE}=±15V, R_G=7.5Ω, V_{CE}=600V, T_j=125℃

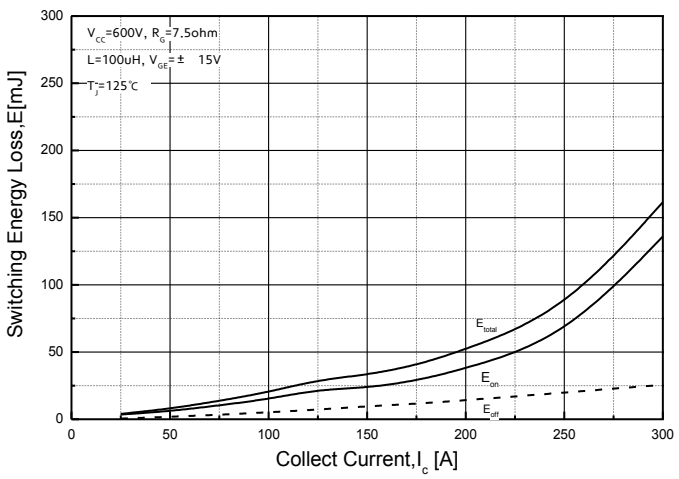


Fig. 9 Gate Charge Characteristics

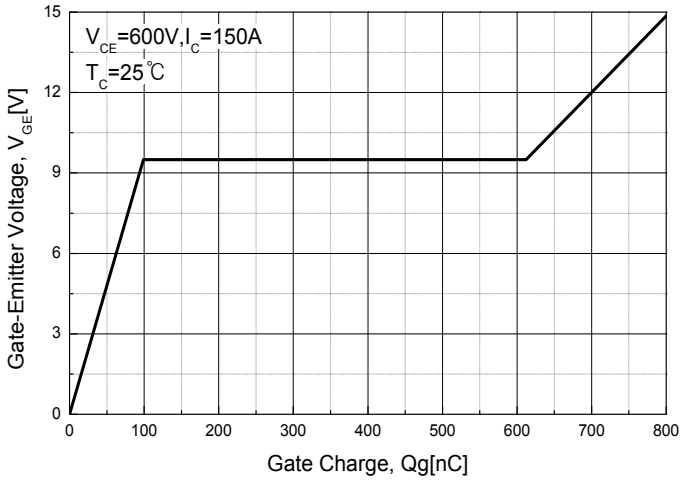
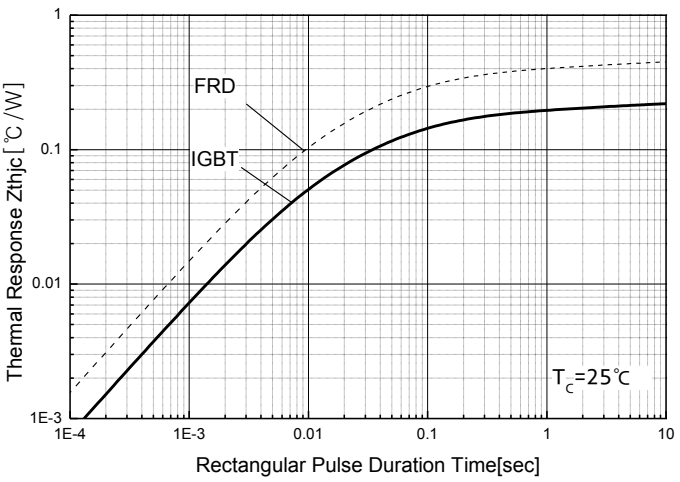


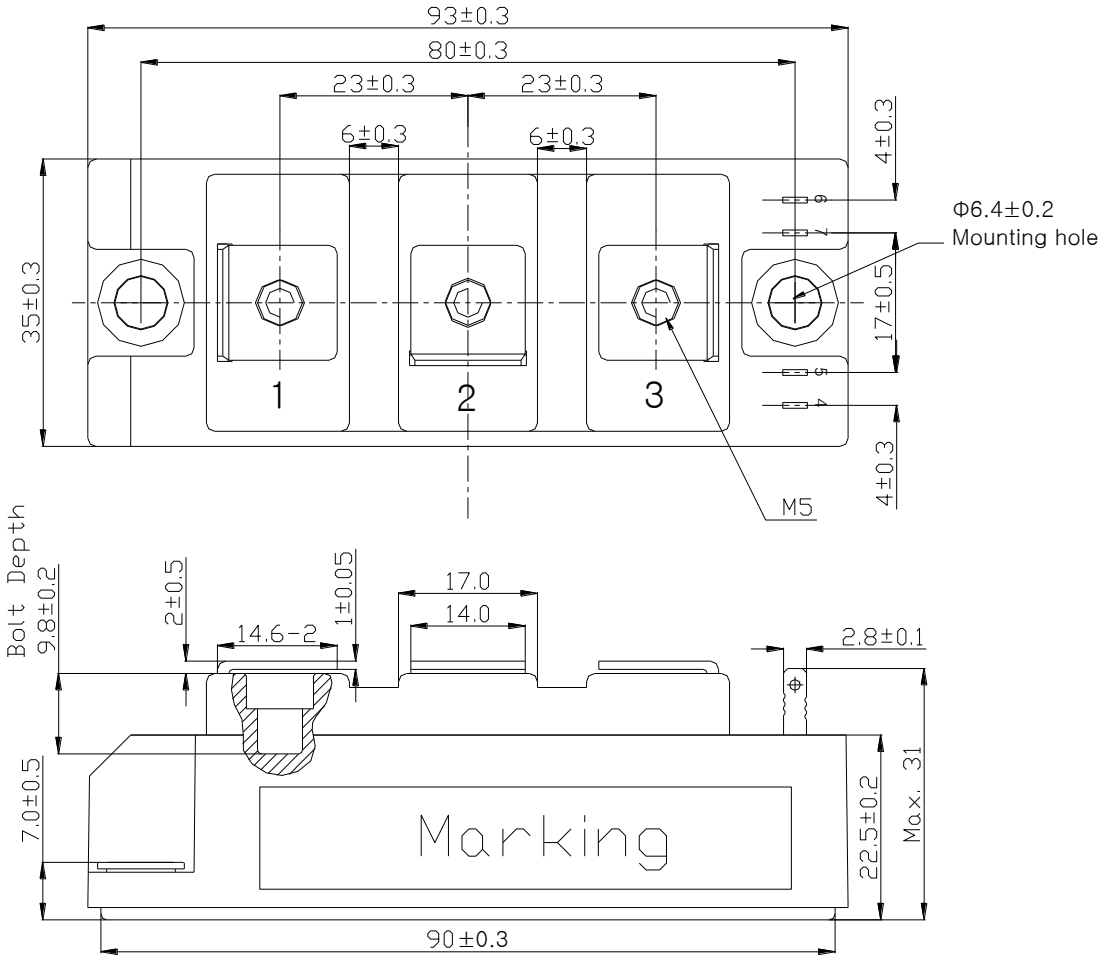
Fig. 10 Transient Thermal Resistor



■ Package Out Line Information

FD7 Package

Dimensions in mm



■ Internal Circuit