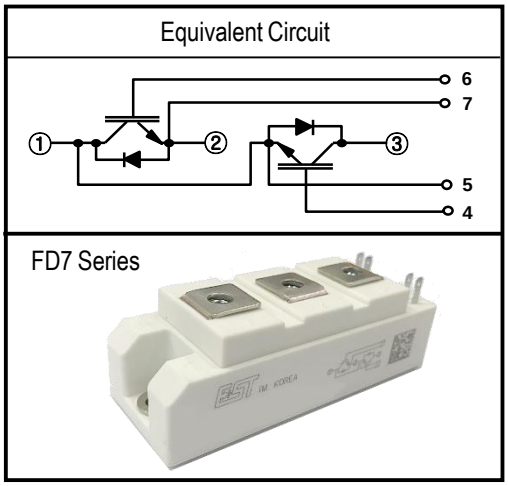
ESJ200SH65F

Trench/Fieldstop IGBT Module

Equivalent Circuit and Package



Please see the package out line information

Features

- High Speed Switching
- BV_{CES} = 650V
- Low Conduction Loss : $V_{CE(sat)}$ = 1.6V (typ.)
- Fast & Soft Anti-Parallel FWD
- Short circuit rated : Min. 5uS at T_C=25℃
- Reduced EMI and RFI
- Isolation Type Package

Applications

- Welding Machine
- Induction Heating
- UPS

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

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	-	650	V
V_{GES}	Gate-emitter peAF voltage	-	±20	V
I_C	DC-collector current	T_C = 25℃	400	A
		T_C = 80℃	200	A
I_{CM}(1)	Repetitive peAF collector current	1ms	400	A
I_F	Diode continuous forward current	T_C = 80℃	200	A
I_{FM}	Diode repetitive peAF forward current	-	400	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 *1) Repetitive rating : Pulse width limited by max junction temperature
(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 BreAFdown Voltage	V_{GE} = 0V , I_C = 1mA	650	-	-	V
$V_{GE(th)}$	G-E threshold voltage	I_C = 250uA, V_{CE} = V_{GE}	5.8	-	6.7	V
I_{CES}	Zero gate voltage collector current	V_{GE} = 0V, V_{CE} = 600V	-	-	100	uA
I_{GES}	G-E leAFage current	V_{GE} = ±20V, V_{CE} = 0V	-	-	±0.2	μA
R_{int}	Internal Gate resistor	-	-	1.6	-	Ω
$V_{CE(Sat)}$	C-E saturation voltage	I_C = 200A, V_{GE} = 15V, T_j = 25℃	-	1.6	2.0	V
		I_C = 200A, V_{GE} = 15V, T_j = 125℃	-	1.8	-	V
C_{ies}	Input capacitance	V_{GE} = 0V, f = 1MHz, V_{CE} = 25V	-	14500	-	pF
C_{oes}	Output capacitance		-	900	-	
C_{res}	Reverse transfer capacitance		-	540	-	
td(on)	Turn-on delay time	V_{CE} = 300V, I_C = 200A, V_{GE} = ±15V, R_G = 5.1Ω, T_j = 25℃, Inductive load	-	330	-	ns
tr	Turn-on rise time		-	130	-	
td(off)	Turn-off delay time		-	310	-	
tf	Turn-off fall time		-	75	-	
E_{on}	Turn-on Energy loss		-	1.6	-	mJ
E_{off}	Turn-off Energy loss		-	6.9	-	
td(on)	Turn-on delay time	V_{CE} = 300V, I_C = 200A, V_{GE} = ±15V, R_G = 5.1Ω, T_j = 125℃, Inductive load	-	370	-	ns
tr	Turn-on rise time		-	140	-	
td(off)	Turn-off delay time		-	350	-	
tf	Turn-off fall time		-	80	-	
E_{on}	Turn-on Energy loss		-	1.8	-	mJ
E_{off}	Turn-off Energy loss		-	7.2	-	
T_{sc}	Short Circuit Withstand Time	V_{cc} = 300V, V_{GE} = 15V, @T_j = 25℃	5	-	-	uS
Q_g	Total gate charge	V_{GE} = ±15V, V_{CE} = 300V, I_C = 200A	-	970	-	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=200A	T_j =25℃	-	2.1	2.5	V
			T_j =125℃	-	2.3	-	
trr	Diode Reverse Recovery Time	I_F=200A, V_R=300V di/dt= -1300A/uS	T_j =25℃	-	85		nS
			T_j =125℃	-	110	-	
I_{rr}	Diode PeAF Reverse Recovery Current		T_j =25℃	-	60	-	A
			T_j =125℃	-	70	-	
Q_{rr}	G-E leAFage current		T_j =25℃	-	2550	-	nC
			T_j =125℃	-	3850	-	

■ Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case	per IGBT	-	-	0.24	℃/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℃)

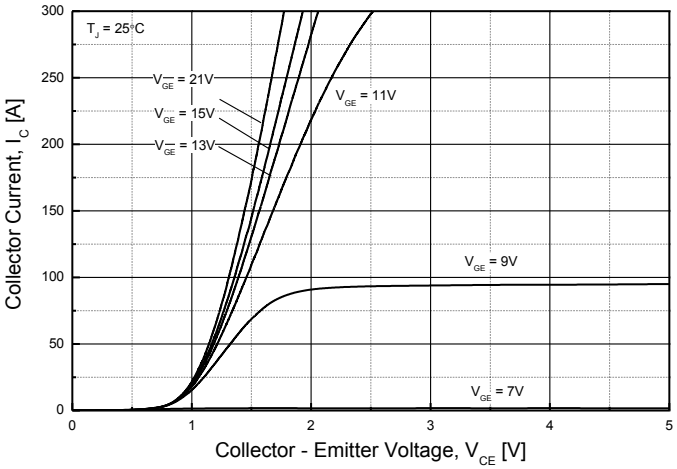


Fig. 2 Typical IGBT output characteristics(T_j = 125℃)

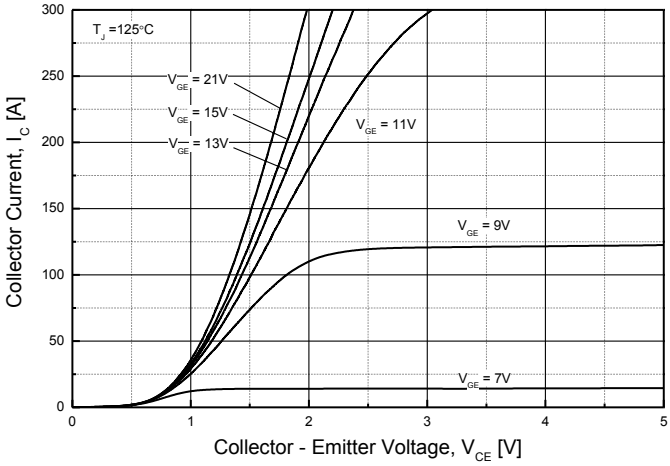


Fig. 3 Typical IGBT output characteristics

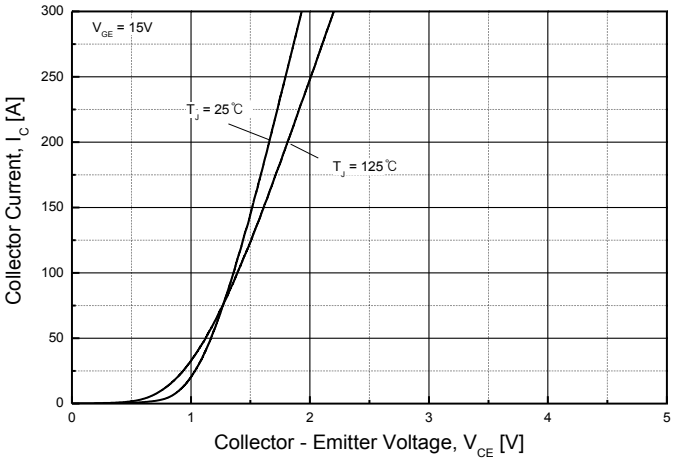


Fig. 4 Typical diode forward characteristics

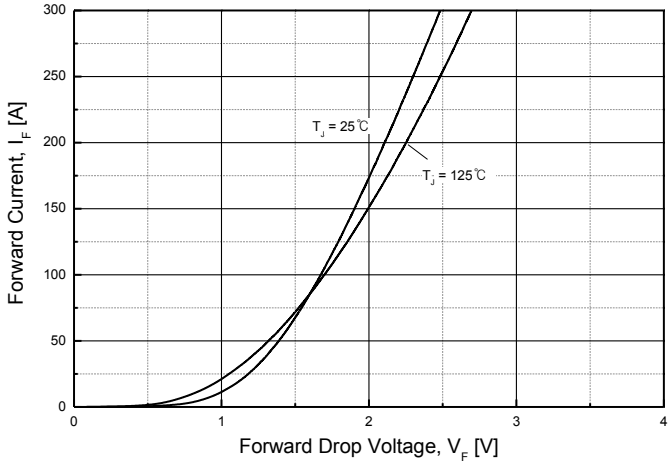


Fig. 5 Typical Switching Energy Loss =f(R_G)
V_{GE}=±15V, I_C=200A, V_{CE}=300V, T_j=25℃

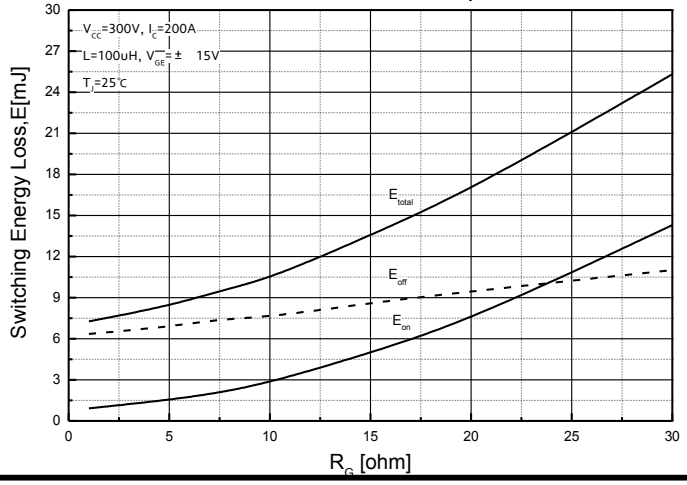
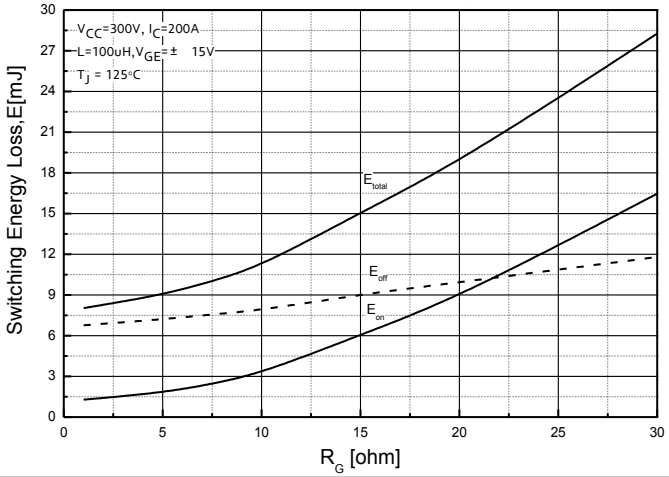


Fig. 6 Typical Switching Energy Loss =f(R_G)
V_{GE}=±15V, I_C=200A, V_{CE}=300V, T_j=125℃



■ Performance Curves

Fig. 7 Typical Switching Energy Loss =f(Ic)
V_{GE}=±15V, R_G=5.1Ω, V_{CE}=300V, T_j=25℃

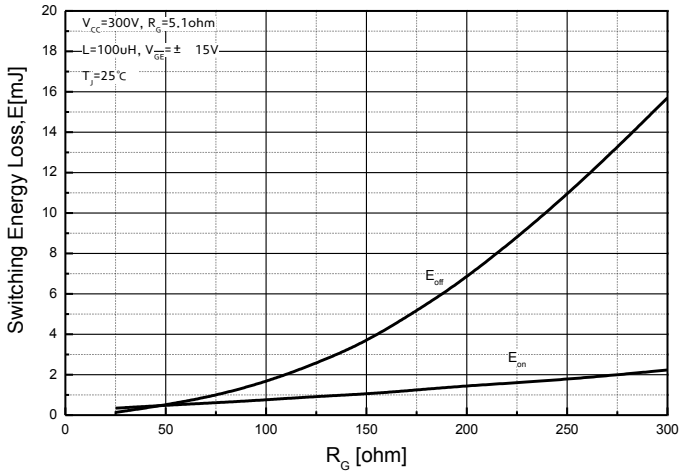


Fig. 8 Typical Switching Energy Loss =f(Ic)
V_{GE}=±15V, R_G=5.1Ω, V_{CE}=300V, T_j=125℃

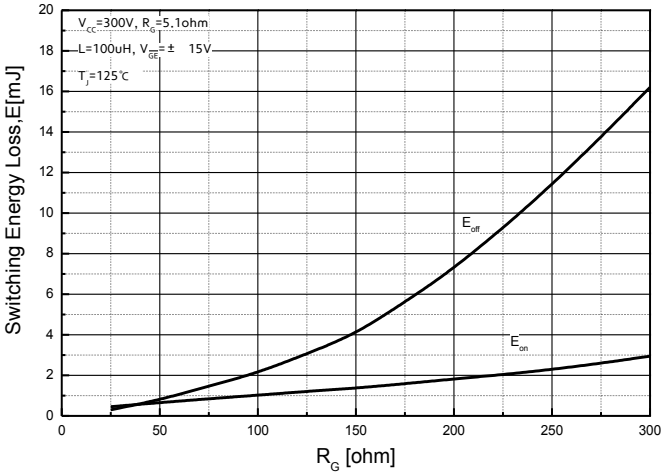


Fig. 9 Gate Charge Characteristics

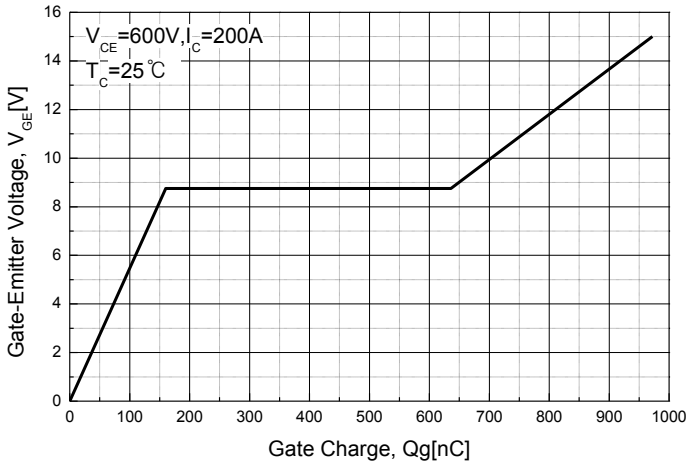
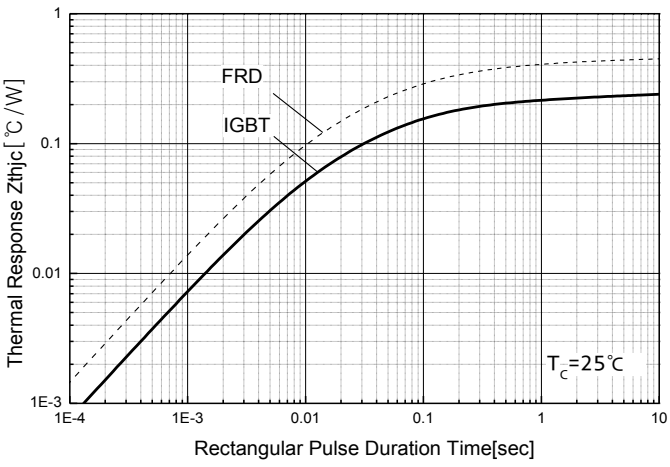


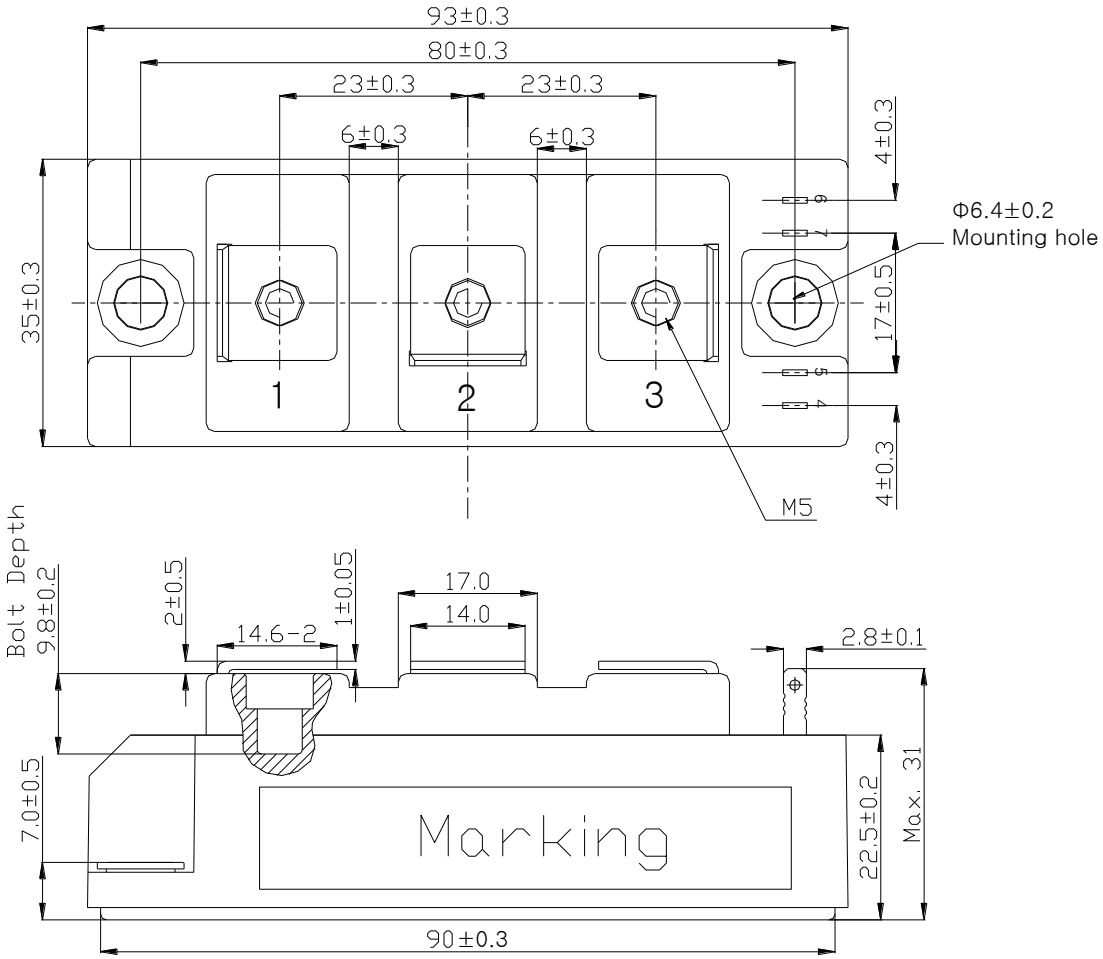
Fig. 10 Transient Thermal Resistor



■ Package Out Line Information

FD7 Package

Dimensions in mm



■ Internal Circuit