

ESJ100SH60N

High Power NPT & Rugged Type IGBT Module

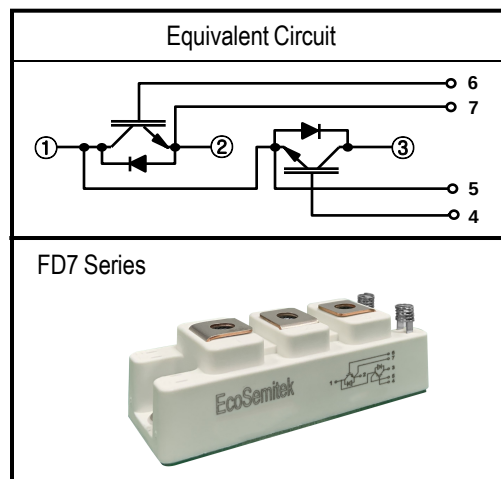
Features

- High Speed Switching
- $BV_{CES} = 600V$
- Low Conduction Loss : $V_{CE(sat)} = 1.95V$ (typ.)
- Fast & Soft Anti-Parallel FWD
- Short circuit rated : Min. 10uS at $T_C=100^\circ C$
- Reduced EMI and RFI
- Isolation Type Package

Applications

- Welding Machine
- UPS

Equivalent Circuit and Package



Please see the package out line information

Absolute Maximum Ratings @ $T_C=25^\circ C$ (Per Leg)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	-	600	V
V_{GES}	Gate-emitter peak voltage	-	± 20	V
I_C	DC-collector current	$T_C = 25^\circ C$	200	A
		$T_C = 80^\circ C$	100	A
$I_{CM}^{(1)}$	Repetitive peak collector current	1ms	200	A
I_F	Diode continuous forward current	$T_C = 80^\circ C$	100	A
I_{FM}	Diode repetitive peak forward current	-	200	A
$T_J^{(2)}$	Operating junction temperature	-	$-40 \sim 125$	$^\circ C$
T_{stg}	Storage temperature range	-	$-40 \sim 125$	$^\circ C$
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 $150^\circ C$

Electrical Characteristics of IGBT @ $T_c=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{CES}	C - E Breakdown Voltage	$V_{GE} = 0V, I_C = 1mA$	600	-	-	V
$V_{GE(th)}$	G-E threshold voltage	$I_C = 250\mu A, V_{CE} = V_{GE}$	3.5	-	5.5	V
I_{CES}	Zero gate voltage collector current	$V_{GE} = 0V, V_{CE} = 600V$	-	-	100	μA
I_{GES}	G-E leakage current	$V_{GE} = \pm 20V, V_{CE} = 0V$	-	-	± 0.2	μA
$V_{CE(Sat)}$	C-E saturation voltage	$I_C = 100A, V_{GE} = 15V, T_j = 25^{\circ}\text{C}$	-	1.95	2.35	V
		$I_C = 100A, V_{GE} = 15V, T_j = 125^{\circ}\text{C}$	-	2.3	-	V
C_{ies}	Input capacitance	$V_{GE} = 0V, f = 1MHz, V_{CE} = 25V$	-	5850	-	pF
C_{oes}	Output capacitance		-	780	-	
C_{res}	Reverse transfer capacitance		-	280	-	
$td(on)$	Turn-on delay time	$V_{CE} = 300V, I_C = 100A,$ $V_{GE} = \pm 15V, R_G = 10\Omega,$ $T_j = 25^{\circ}\text{C},$ Inductive load	-	120	-	ns
tr	Turn-on rise time		-	80	-	
$td(off)$	Turn-off delay time		-	250	-	
tf	Turn-off fall time		-	70	-	
E_{rr}	Diode Recovery Energy loss		-	0.4	-	mJ
E_{on}	Turn-on Energy loss		-	1.0	-	
E_{off}	Turn-off Energy loss		-	1.9	-	
$td(on)$	Turn-on delay time	$V_{CE} = 300V, I_C = 100A,$ $V_{GE} = \pm 15V, R_G = 10\Omega,$ $T_j = 125^{\circ}\text{C},$ Inductive load	-	140	-	ns
tr	Turn-on rise time		-	130	-	
$td(off)$	Turn-off delay time		-	270	-	
tf	Turn-off fall time		-	80	-	
E_{rr}	Diode Recovery Energy loss		-	0.8	-	mJ
E_{on}	Turn-on Energy loss		-	1.2	-	
E_{off}	Turn-off Energy loss		-	2.0	-	
T_{sc}	Short Circuit Withstand Time	$V_{cc} = 300V, V_{GE} = 15V, @T_j = 100^{\circ}\text{C}$	10	-	-	μS
Q_g	Total gate charge	$V_{GE} = \pm 15V, V_{CE} = 300V, I_C = 100A$	-	560	-	nC

■ Electrical Characteristics of FRD @ $T_c=25^{\circ}\text{C}$ (unless otherwise specified)

Symbol	Parameter	Conditions		Min.	Typ.	Max.	Unit
V _{FM}	Diode Forward Voltage	I _F =100A	T _j =25℃	-	1.5	1.8	V
			T _j =125℃	-	1.4	-	
t _{rr}	Diode Reverse Recovery Time	I _F =100A, V _R =300V di/dt= -1000A/uS	T _j =25℃	-	130	180	nS
			T _j =125℃	-	190	-	
I _{rr}	Diode Peak Reverse Recovery Current		T _j =25℃	-	60	-	A
			T _j =125℃	-	90	-	
Q _{rr}	G-E leakage current		T _j =25℃	-	3900	-	nC
			T _j =125℃	-	8550	-	

■ Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$R_{\theta JC}$	Junction-to-Case	per IGBT	-	-	0.25	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Junction-to-Case	per DIODE	-	-	0.50	$^{\circ}\text{C}/\text{W}$
$R_{\theta CK}$	Case-to-Heatsink (Conductive grease applied)	per IGBT	0.05	-	-	$^{\circ}\text{C}/\text{W}$
Weight	Weight of Module		-	-	160	g

Performance Curves

Fig. 1 Typical IGBT output characteristics ($T_J = 25^\circ\text{C}$)

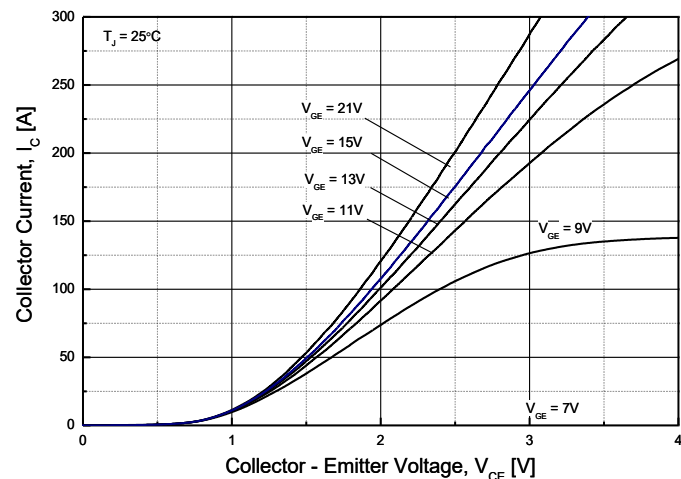


Fig. 2 Typical IGBT output characteristics ($T_J = 125^\circ\text{C}$)

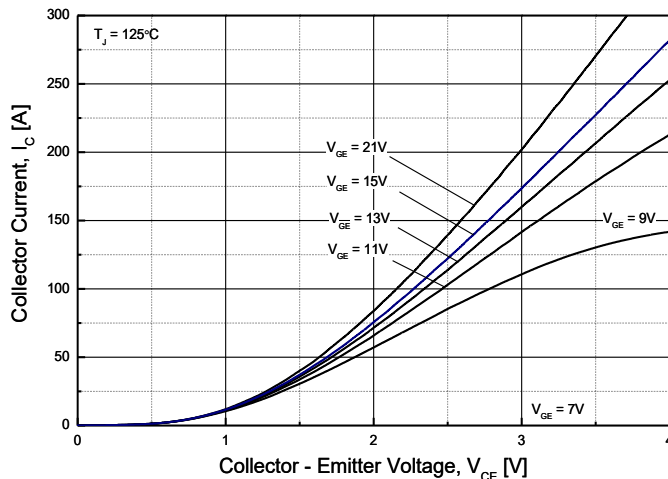


Fig. 3 Typical IGBT output characteristics

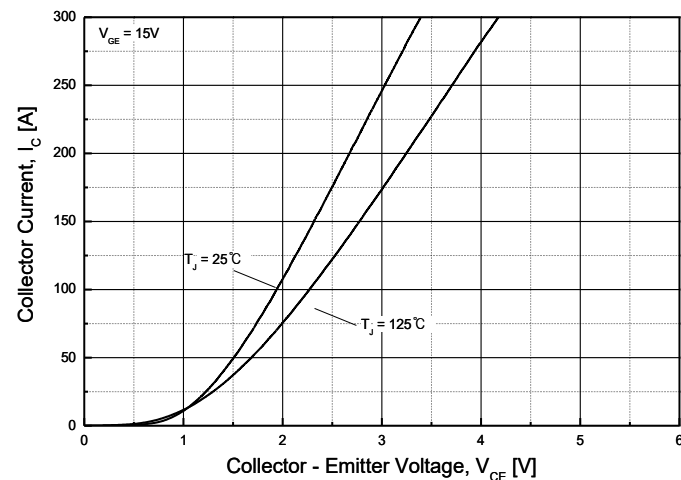


Fig. 4 Typical diode forward characteristics

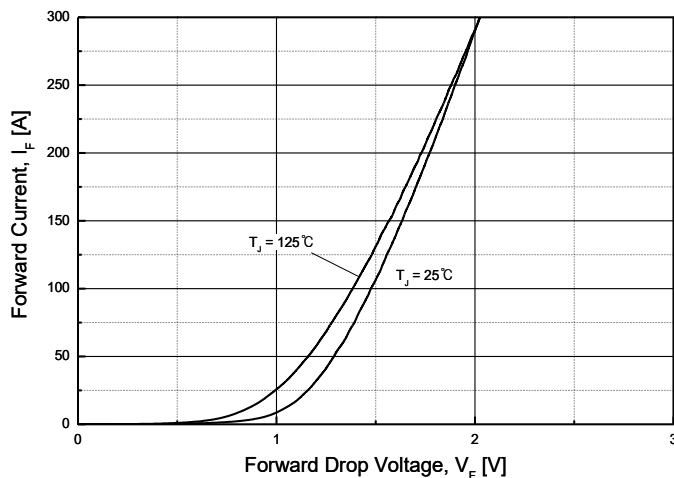


Fig. 5 Typical Switching Energy Loss $= f(R_G)$
 $V_{GE} = \pm 15\text{V}$, $I_C = 100\text{A}$, $V_{CE} = 300\text{V}$, $T_J = 25^\circ\text{C}$

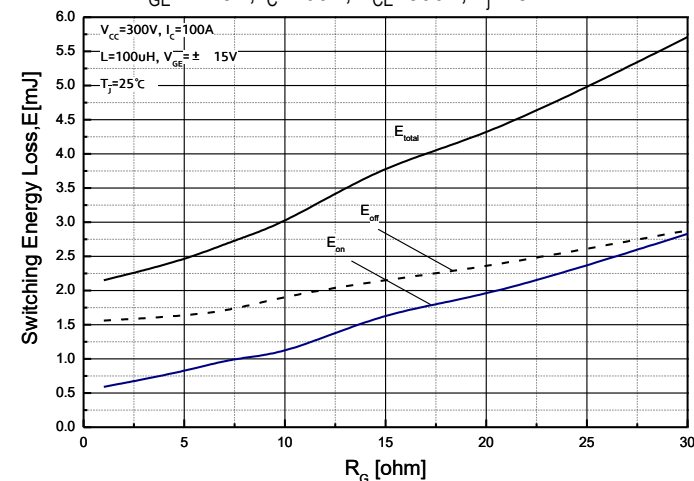
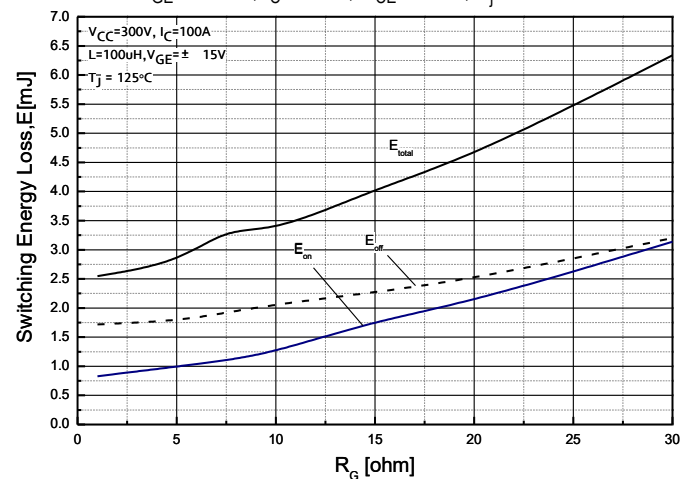


Fig. 6 Typical Switching Energy Loss $= f(R_G)$
 $V_{GE} = \pm 15\text{V}$, $I_C = 100\text{A}$, $V_{CE} = 300\text{V}$, $T_J = 125^\circ\text{C}$



Performance Curves

Fig. 7 Typical Switching Energy Loss =f(I_c)
V_{GE}=±15V, R_G=10Ω, V_{CE}=300V, T_j=25℃

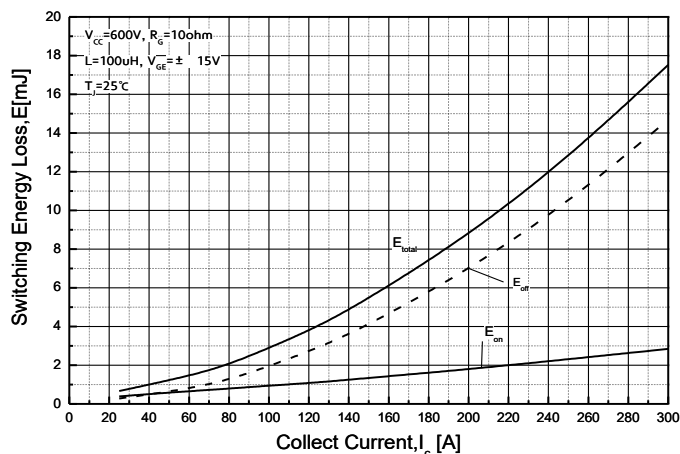


Fig. 8 Typical Switching Energy Loss =f(I_c)
V_{GE}=±15V, R_G=10Ω, V_{CE}=300V, T_j=125℃

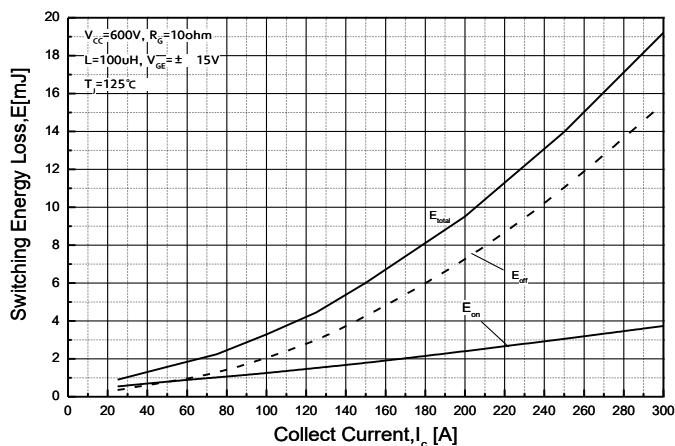


Fig. 9 Gate Charge Characteristics

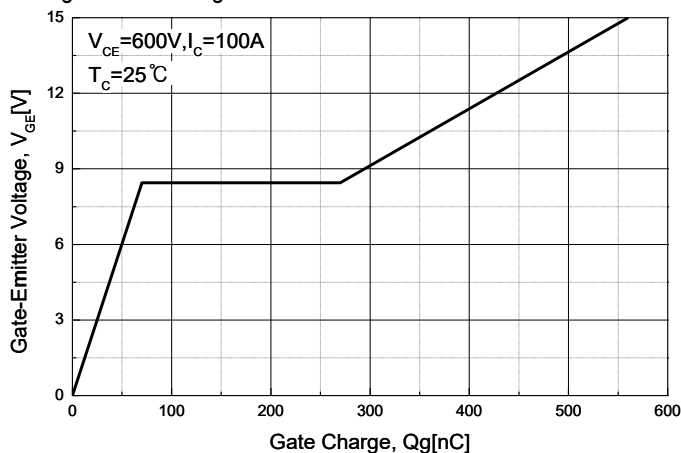
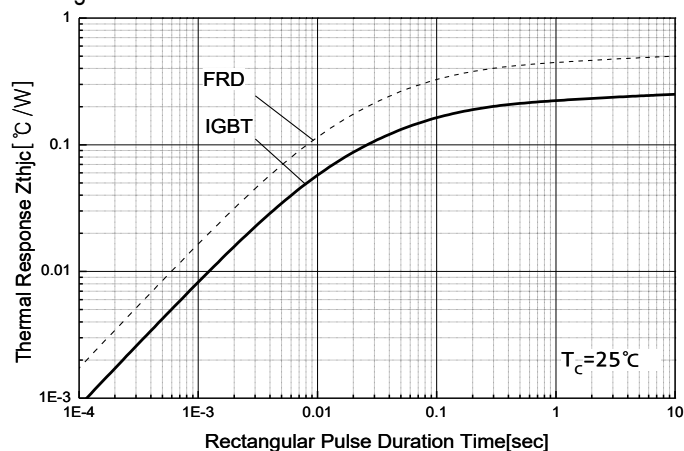


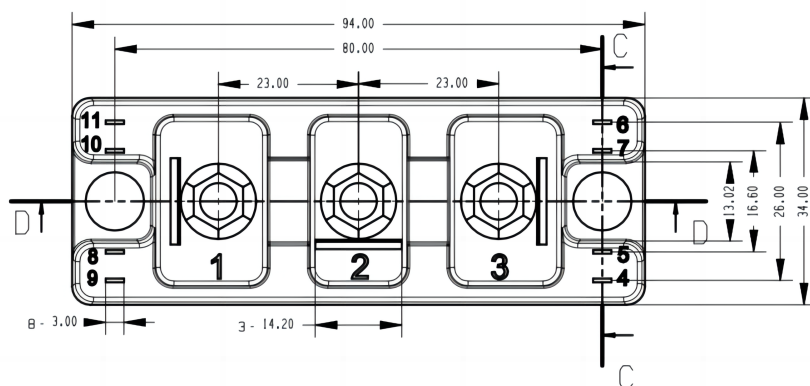
Fig. 10 Transient Thermal Resistor



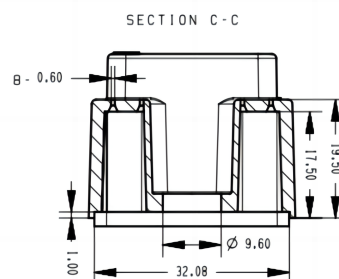
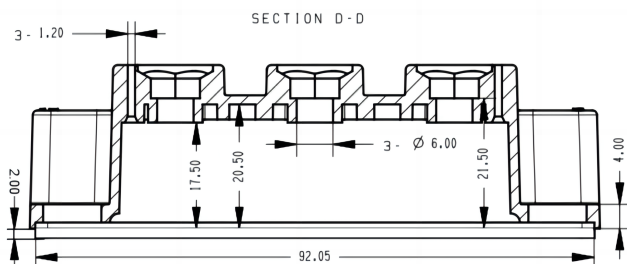
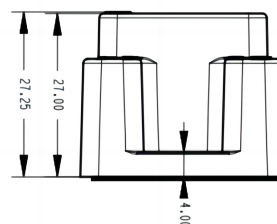
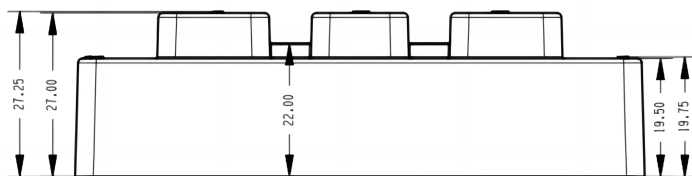
Package Out Line Information

FD7 Package

Dimensions in mm



drawing tolerance (mm) :
 0-10 ± 0.1 10-30 ± 0.15
 30-50 ± 0.2 50-100 ± 0.3



Internal Circuit

