

ESJ75SH120AN

High Power NPT & Rugged Type IGBT Module

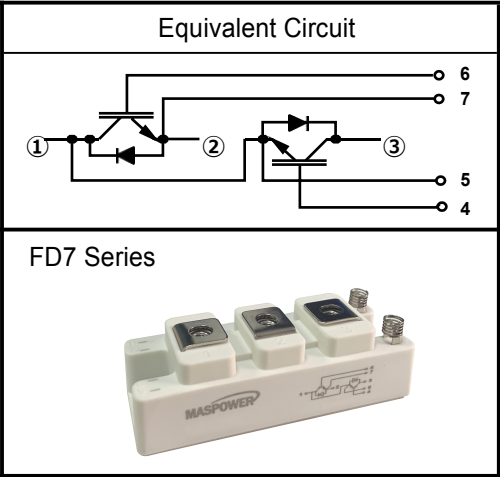
■ Features

- High Speed Switching
- $V_{CES} = 1200V$
- Low Conduction Loss : $V_{CE(sat)} = 3.2V$ (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
- Induction Heating
- UPS

Equivalent Circuit and Package



Please see the package out line information

■ Absolute Maximum Ratings @ $T_J=25^{\circ}C$ (PerLeg)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-emitter voltage	-	1200	V
V_{GES}	Gate-emitter peak voltage	-	± 20	V
I_C	DC-collector current	$T_C = 25^{\circ}C$	150	A
		$T_C = 80^{\circ}C$	75	A
$I_{CM}^{(1)}$	Repetitive peak collector current	1ms	150	A
I_F	Diode continuous forward current	$T_C = 80^{\circ}C$	75	A
I_{FM}	Diode repetitive peak forward current	-	150	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	$V_{GE} = 0V, I_C = 100\mu A$	1200	-	-	V
$V_{GE(th)}$	G-E threshold voltage	$I_C = 250\mu A, V_{CE} = V_{GE}$	4.5	-	6.0	V
I_{CES}	Zero gate voltage collector current	$V_{GE} = 0V, V_{CE} = 1200V$	-	-	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	$I_C = 75A, V_{GE} = 15V, T_j = 25^{\circ}\text{C}$	-	3.2	3.7	V
		$I_C = 75A, V_{GE} = 15V, T_j = 125^{\circ}\text{C}$	-	3.6	-	V
C_{ies}	Input capacitance	$V_{GE} = 0V, f = 1\text{MHz}, V_{CE} = 25V$	-	tbd	-	pF
C_{oes}	Output capacitance		-	tbd	-	
C_{res}	Reverse transfer capacitance		-	tbd	-	
$t_{d(on)}$	Turn-on delay time	$V_{CE} = 600V, I_C = 75A, V_{GE} = \pm 15V, R_G = 15\Omega, T_j = 25^{\circ}\text{C},$ Inductive load	-	160	-	ns
t_r	Turn-on rise time		-	100	-	
$t_{d(off)}$	Turn-off delay time		-	470	-	
t_f	Turn-off fall time		-	40	-	
E_{rr}	Diode Recovery Energy loss		-	0.8	-	mJ
E_{on}	Turn-on Energy loss	$V_{CE} = 600V, I_C = 75A, V_{GE} = \pm 15V, R_G = 15\Omega, T_j = 125^{\circ}\text{C},$ Inductive load	-	4.7	-	
E_{off}	Turn-off Energy loss		-	2.3	-	
$t_{d(on)}$	Turn-on delay time		-	180	-	ns
t_r	Turn-on rise time		-	140	-	
$t_{d(off)}$	Turn-off delay time		-	510	-	
t_f	Turn-off fall time		-	50	-	
E_{rr}	Diode Recovery Energy loss		-	1.5	-	mJ
E_{on}	Turn-on Energy loss		-	6.6	-	
E_{off}	Turn-off Energy loss		-	3.1	-	
T_{sc}	Short Circuit Withstand Time	$V_{cc} = 600V, V_{GE} = 15V, @T_c = 100^{\circ}\text{C}$	10	-	-	μS
Q_g	Total gate charge	$V_{GE} = \pm 15V, V_{CE} = 600V, I_C = 75A$	-	650	-	nC

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

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit	
V _{FM}	Diode Forward Voltage	I _F =75A	T _J =25℃	-	2.2	2.6	V
			T _J =125℃	-	2.4	-	
t _{rr}	Diode Reverse Recovery Time	I _F =75A, V _R =600V di/dt= -1000A/uS	T _J =25℃	-	120	150	nS
			T _J =125℃	-	150	-	
I _{rr}	Diode Peak Reverse Recovery Current		T _J =25℃	-	50	-	A
			T _J =125℃	-	80	-	
Q _{rr}	G-E leakage current		T _J =25℃	-	3000	-	nC
			T _J =125℃	-	6000	-	

■ Thermal Characteristics and Weight

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
R _{θJC}	Junction-to-Case	per IGBT	-	-	0.18	℃/W
R _{θJC}	Junction-to-Case	per DIODE	-	-	0.44	℃/W
R _{θCK}	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 ($T_J = 25^\circ\text{C}$)

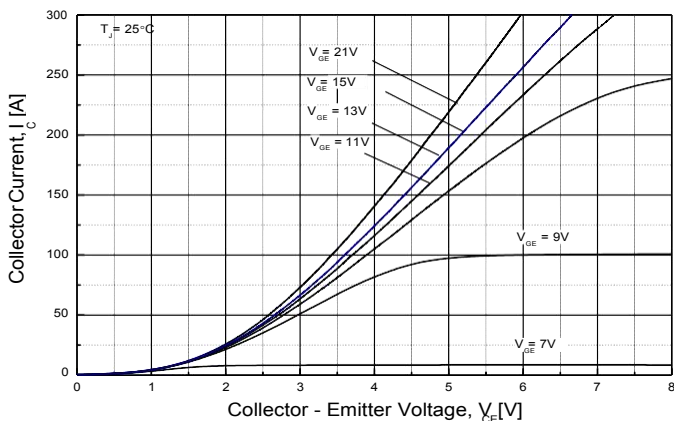


Fig. 2 Typical IGBT output characteristics ($T_J = 125^\circ\text{C}$)

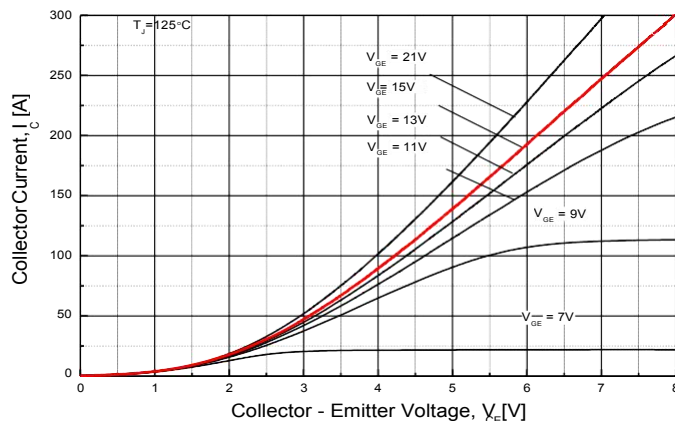


Fig. 3 Typical IGBT output characteristics

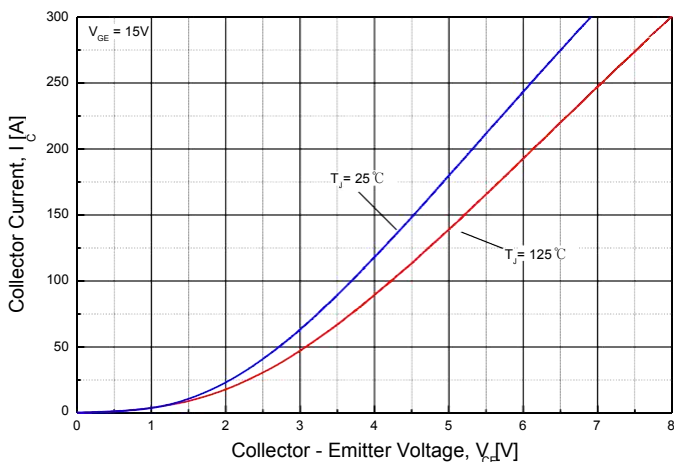


Fig. 4 Typical diode forward characteristics

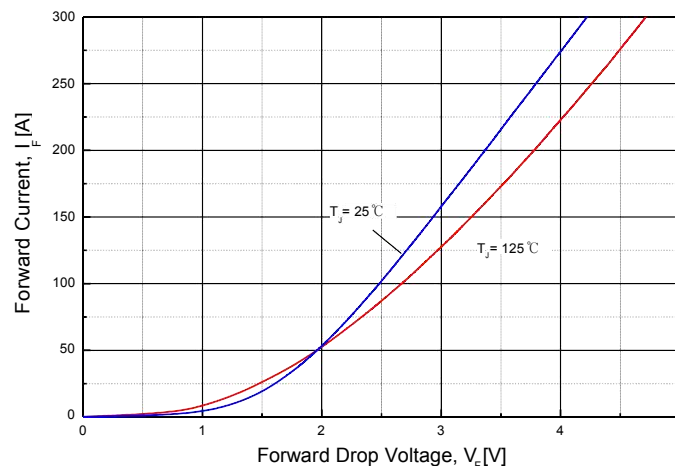


Fig. 5 Typical Switching Energy Loss = $f(R_G)$
 $V_{GE} = \pm 15\text{V}, I_C = 75\text{A}, V_{CE} = 600\text{V}, T_J = 25^\circ\text{C}$

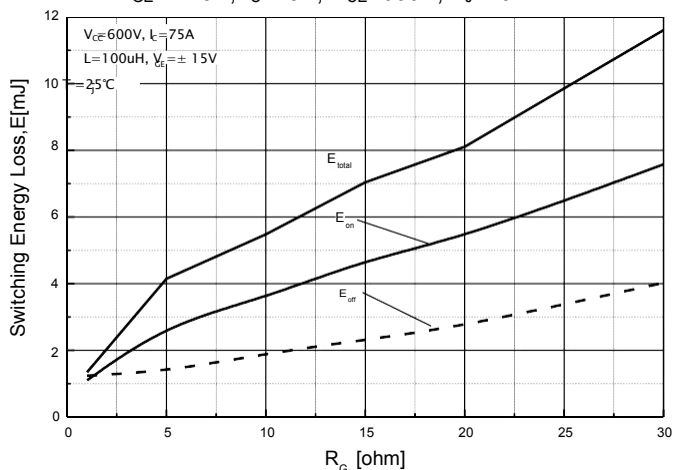
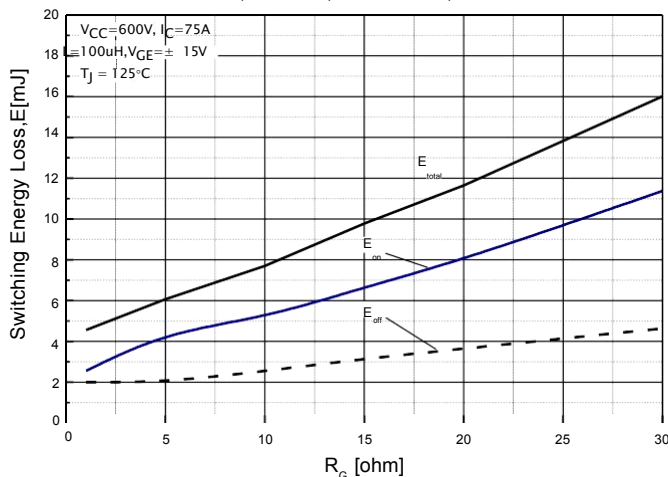


Fig. 6 Typical Switching Energy Loss = $f(R_G)$
 $V_{GE} = \pm 15\text{V}, I_C = 75\text{A}, V_{CE} = 600\text{V}, T_J = 125^\circ\text{C}$



■ Performance Curves

Fig. 7 Typical Switching Energy Loss =f(Ic)
 $V_{GE}=\pm 15V$, $R_G=15\Omega$, $V_{CE}=600V$, $T_J=25^\circ C$

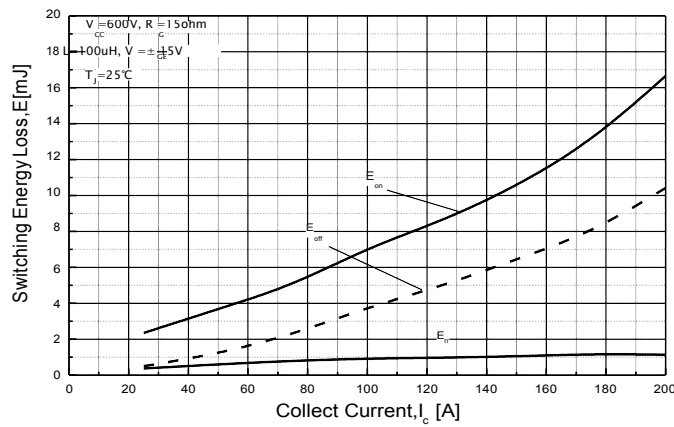
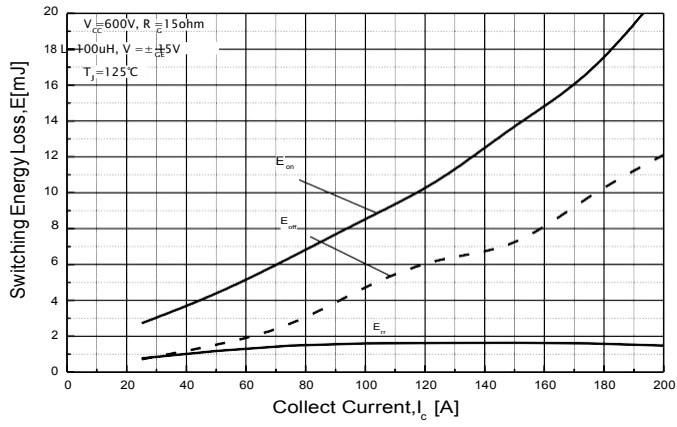


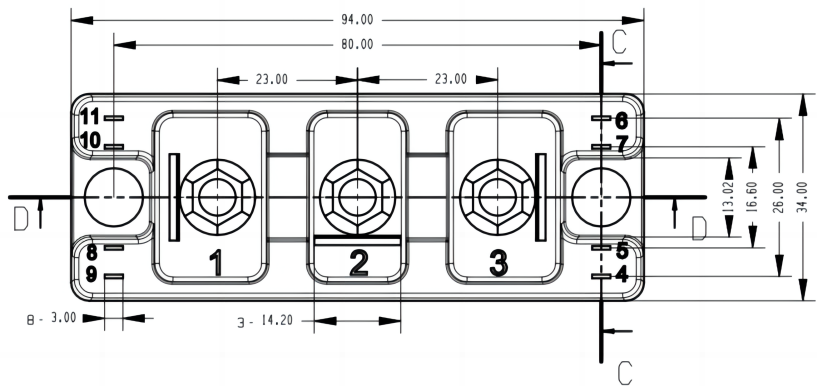
Fig. 8 Typical Switching Energy Loss =f(Ic)
 $V_{GE}=\pm 15V$, $R_G=15\Omega$, $V_{CE}=600V$, $T_J=125^\circ C$



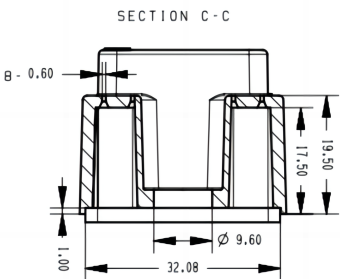
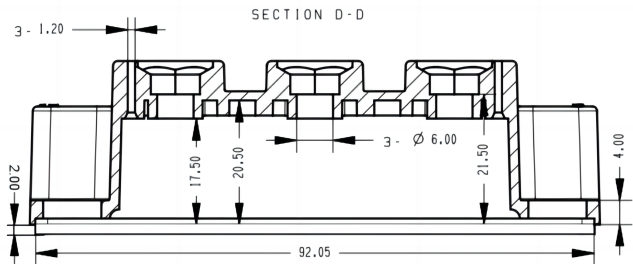
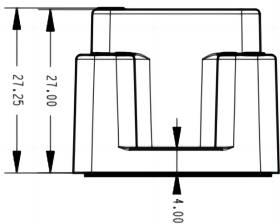
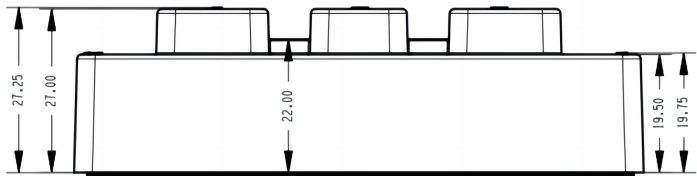
■ Package Out Line Information

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

