



SMGQ75H120FNB

1200V 75A Field Stop Trench IGBT

Preliminary Data

Features:

- Low $V_{CE(sat)}$ Trench IGBT Technology
- High Speed Switching Series
- Safe Paralleling
- Square RBSOA
- Very Fast Recovery Antiparallel Diode
- Low Thermal Resistance

Applications:

- Uninterruptible Power Supply
- Welding Machines
- Solar Inverters
- PFC

Absolute Maximum Rated Values ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Description	Conditions	Values	Units
V_{CES}	Collector-Emitter Blocking Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Continuous Collector Current	$T_C=100^{\circ}\text{C}$	75	A
		$T_C=25^{\circ}\text{C}$	150	A
I_{CP}	Pulse Collector Current		300	A
I_F	Continuous Forward Current	$T_C=100^{\circ}\text{C}$	40	A
		$T_C=25^{\circ}\text{C}$	80	A
I_{FP}	Pulse Forward Current		160	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	600	W



T_J	Maximum Junction Temperature	-40~175	°C
T_{JOP}	Maximum Operating Junction Temperature Range	-40~175	°C
	Soldering Temperature, for 10 sec.	260 (0.063 in. (1.6mm) from case)	

Electrical Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Description	Conditions	Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage	$V_{GE}=0V$, $I_C=1mA$	1200			V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1.5mA$, $V_{CE}=V_{GE}$	4.3	5.1	5.8	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75A$, $V_{GE}=15V$	$T_J=25^{\circ}\text{C}$	1.60	2.10	V
			$T_J=125^{\circ}\text{C}$	2.00		
			$T_J=150^{\circ}\text{C}$	2.05		
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V$, $V_{CE}=1200V$			25	uA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20V$, $V_{CE}=0V$			± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25V$, $V_{GE}=0V$, $f=100kHz$		12.2		nF
C_{oes}	Output Capacitance			0.41		
C_{res}	Reverse Transfer Capacitance			0.13		

IGBT Switching Characteristics ($T_J=25^{\circ}\text{C}$ unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_c=75A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		262		ns
			$T_J=125^{\circ}C$		267		
			$T_J=150^{\circ}C$		269		
t_r	Rise Time		$T_J=25^{\circ}C$		63		ns
			$T_J=125^{\circ}C$		64		
			$T_J=150^{\circ}C$		66		
$t_{d(off)}$	Turn-off Delay Time		$T_J=25^{\circ}C$		258		ns
			$T_J=125^{\circ}C$		259		
			$T_J=150^{\circ}C$		259		



t_f	Fall Time	$V_{CC}=600V, I_C=75A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^\circ C$		153		ns
			$T_J=125^\circ C$		167		
			$T_J=150^\circ C$		169		
E_{on}	Turn-on Switching Loss	$V_{CC}=600V, I_C=75A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $di/dt=977A/\mu s(T_J=150^\circ C),$ Inductive Load	$T_J=25^\circ C$		4.0		mJ
			$T_J=125^\circ C$		4.5		
			$T_J=150^\circ C$		4.6		
E_{off}	Turn-off Switching Loss	$V_{CC}=600V, I_C=75A,$ $R_G=10\Omega, V_{GE}=\pm 15V,$ $du/dt=6390V/\mu s(T_J=150^\circ C),$ Inductive Load	$T_J=25^\circ C$		2.3		mJ
			$T_J=125^\circ C$		2.8		
			$T_J=150^\circ C$		2.9		
Q_G	Total Gate Charge	$V_{CC}=960V, V_{GE}=0V/15V,$ $I_C=75A$			417		nC
Q_{GE}	Gate-Emitter Charge				83		
Q_{GC}	Gate-Collector Charge				175		

Diode Switching Characteristics ($T_J=25^\circ C$ unless otherwise specified)

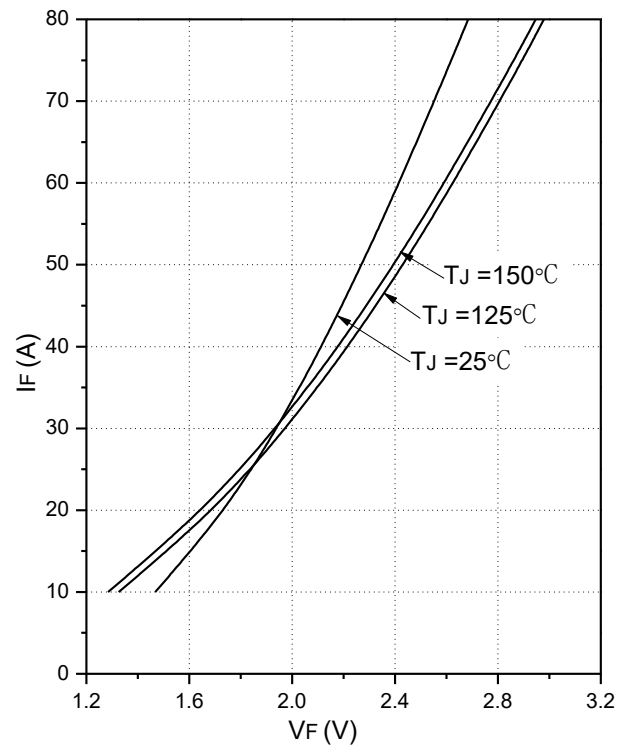
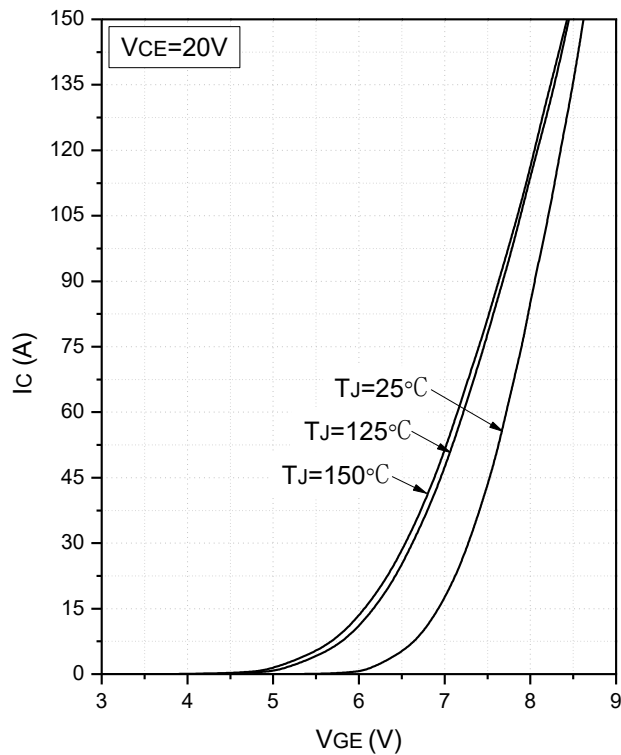
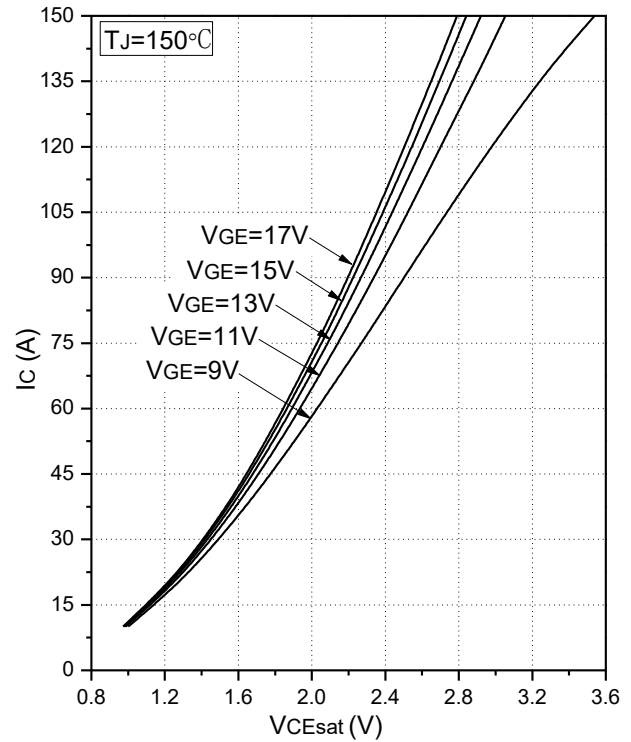
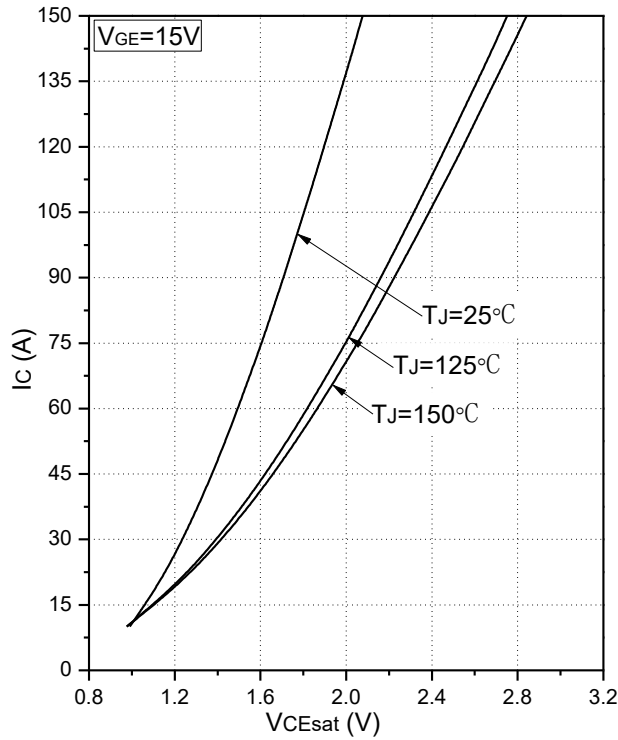
Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _F	Forward On-voltage	I _F =40A	T _J =25°C		2.10		V
			T _J =125°C		2.20		
			T _J =150°C		2.20		
t _{rr}	Reverse Recovery Time	V _R =600V, I _F =40A, R _G =10Ω, V _{GE} =±15V, di/dt=1086A/μs(T _J =150°C), Inductive Load	T _J =25°C		181		ns
			T _J =125°C		239		
			T _J =150°C		250		
Q _{rr}	Reverse Recovery Charge		T _J =25°C		2.19		uC
			T _J =125°C		2.82		
			T _J =150°C		2.92		
I _{rr}	Reverse Recovery Current		T _J =25°C		23.2		A
			T _J =125°C		27.0		
			T _J =150°C		27.5		



E _{rec}	Reverse Recovery Energy	V _R =600V, I _F =40A, R _G =10Ω, V _{GE} =±15V, di/dt=1086A/μs(T _J =150°C), Inductive Load	T _J =25°C		0.77		mJ
			T _J =125°C		1.04		
			T _J =150°C		1.08		

Thermal Characteristics

Symbol	Description	Min.	Typ.	Max.	Units
R _{θJC} (IGBT)	Thermal Resistance: Junction-to-Case		0.25		°C/W
R _{θJC} (Diode)	Thermal Resistance: Junction-to-Case		0.47		°C/W
R _{θJA}	Thermal Resistance: Junction-to-Ambient (typical socket mount)			50	°C/W



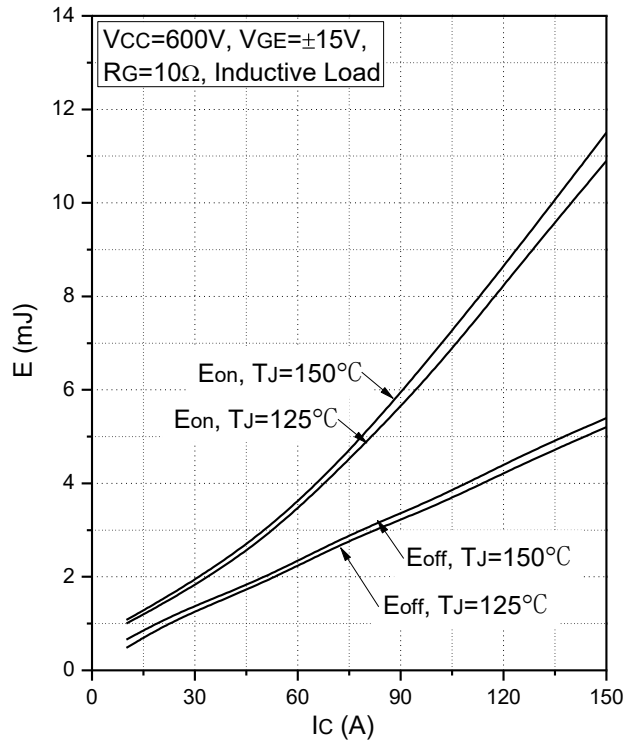


Fig.5 Typical Switching Loss vs. Collector Current

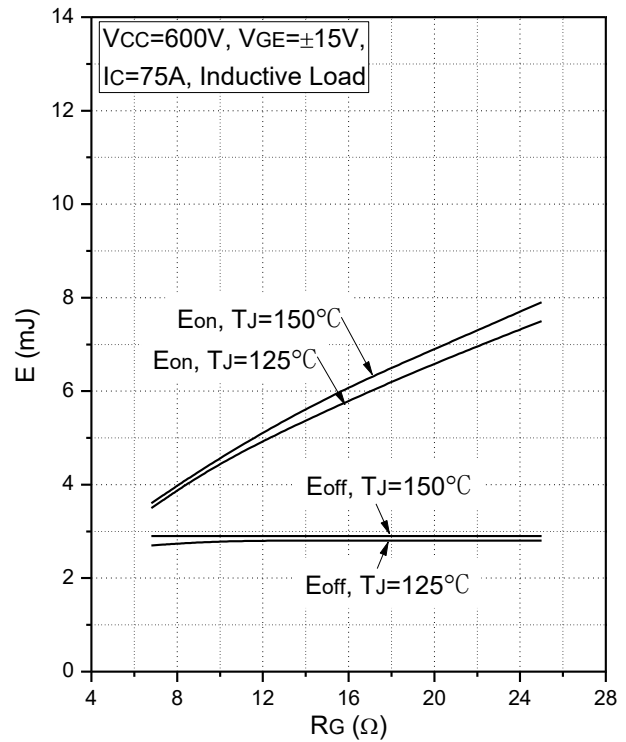


Fig.6 Typical Switching Loss vs. Gate Resistance

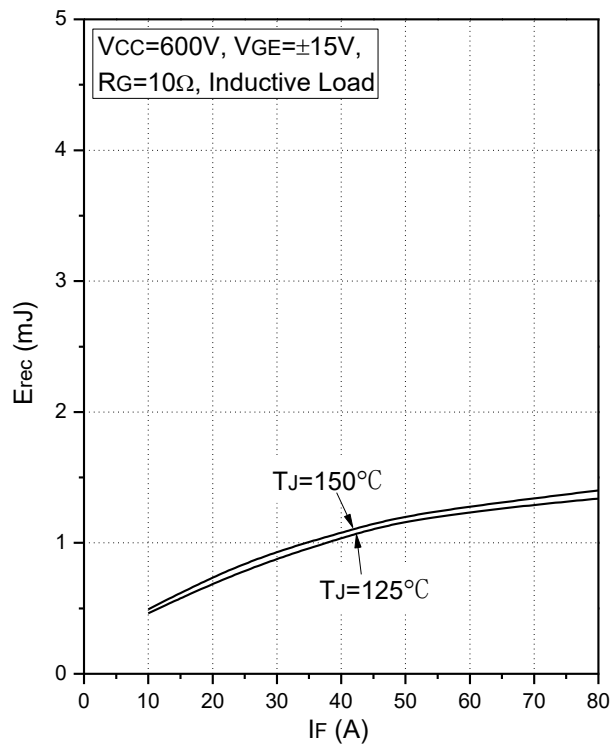


Fig.7 Typical Switching Loss vs. Forward Current

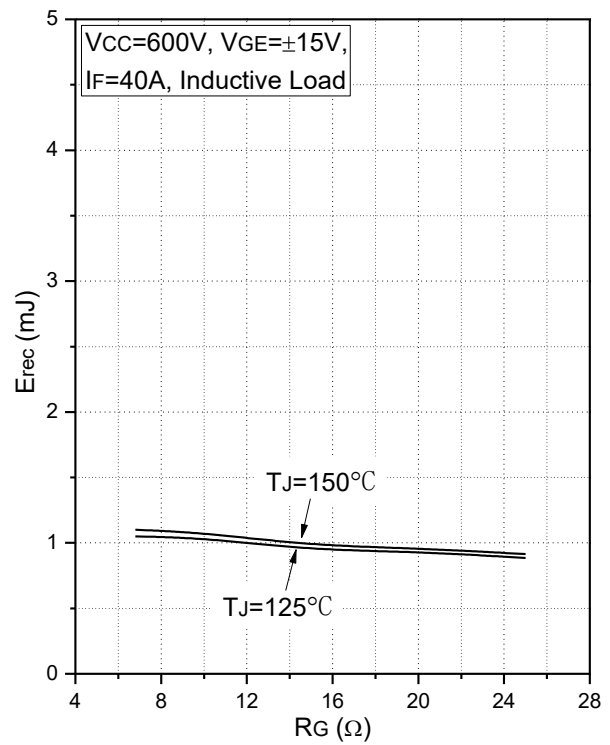
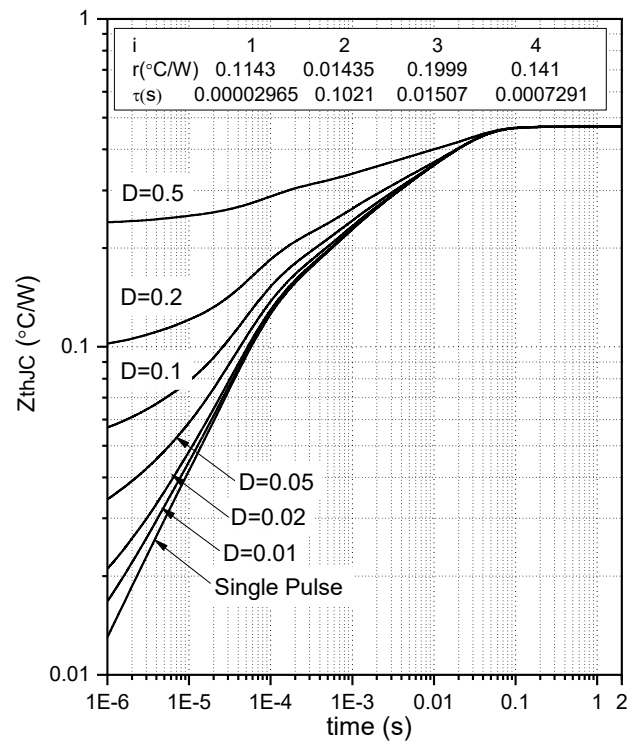
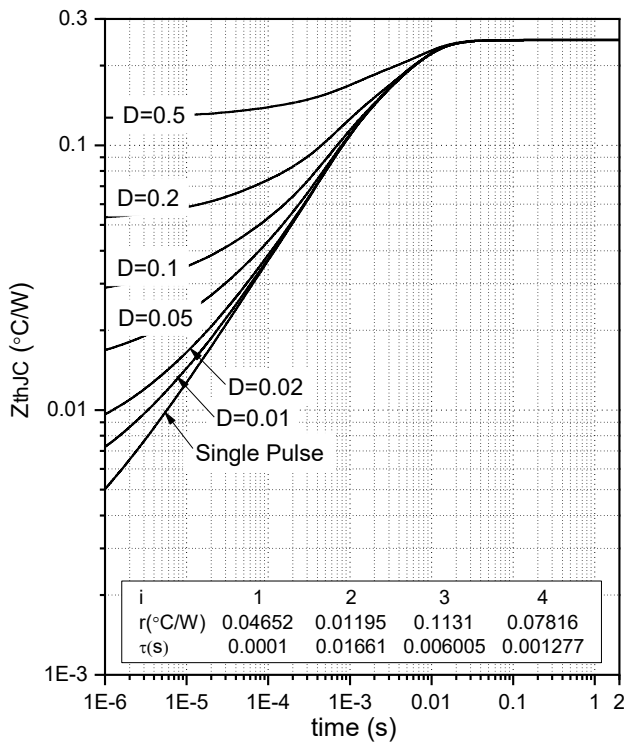
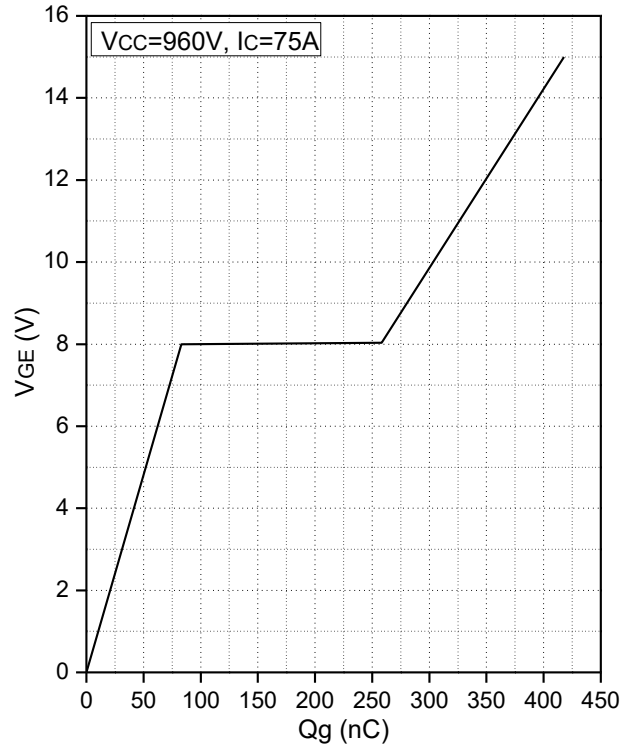
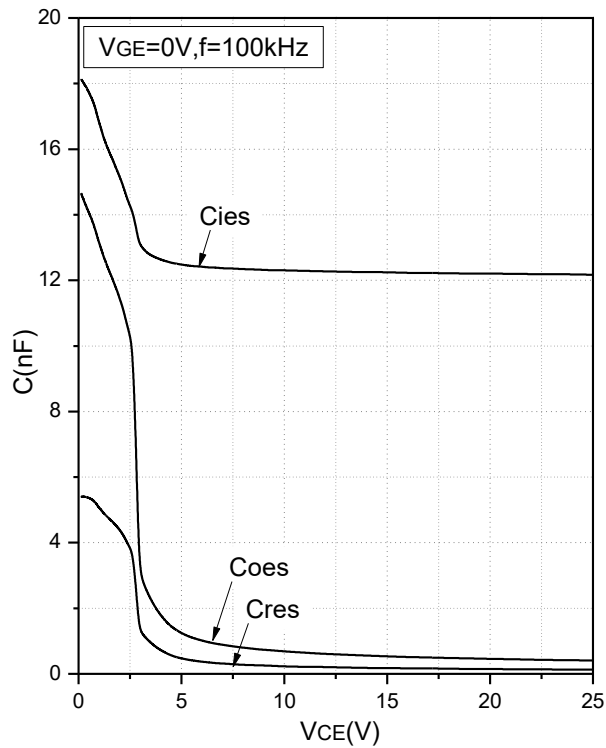


Fig.8 Typical Switching Loss vs. Gate Resistance





Test Circuit:

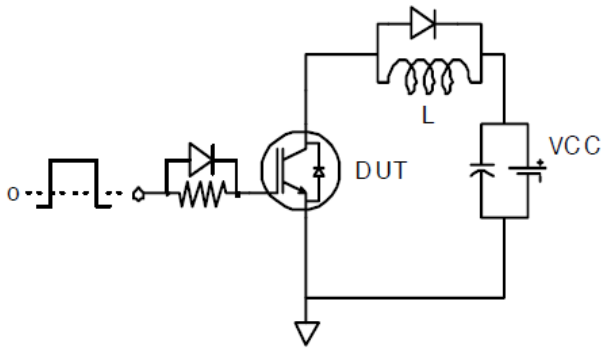


Fig.13 Gate Charge Circuit (turn-off)

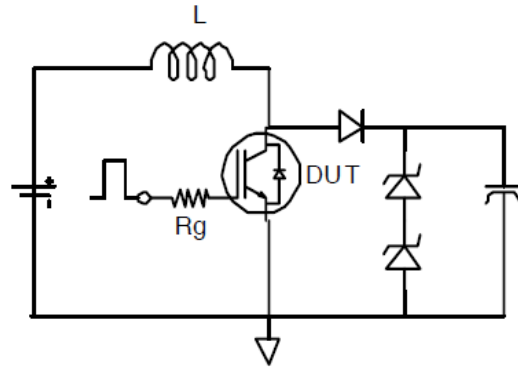


Fig.14 RBSOA Circuit

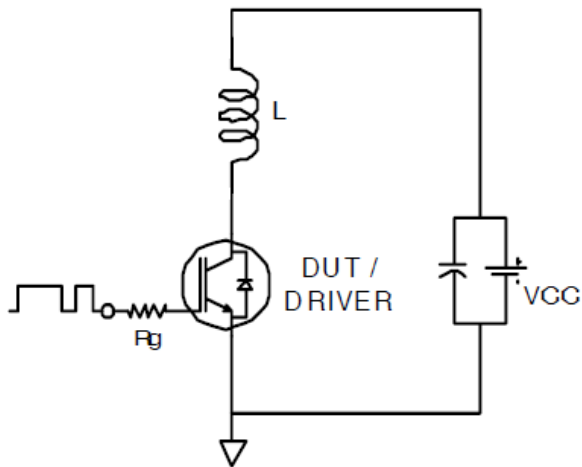


Fig.15 Switching Loss Circuit

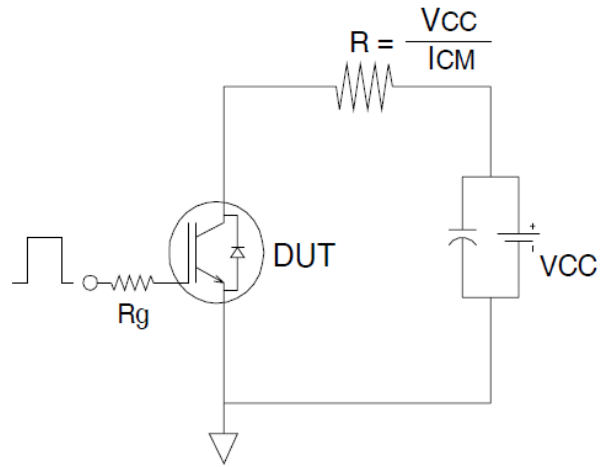


Fig.16 Resistive Load Circuit

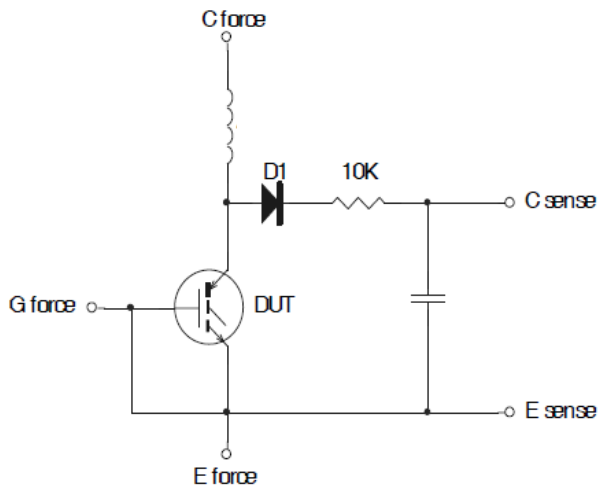
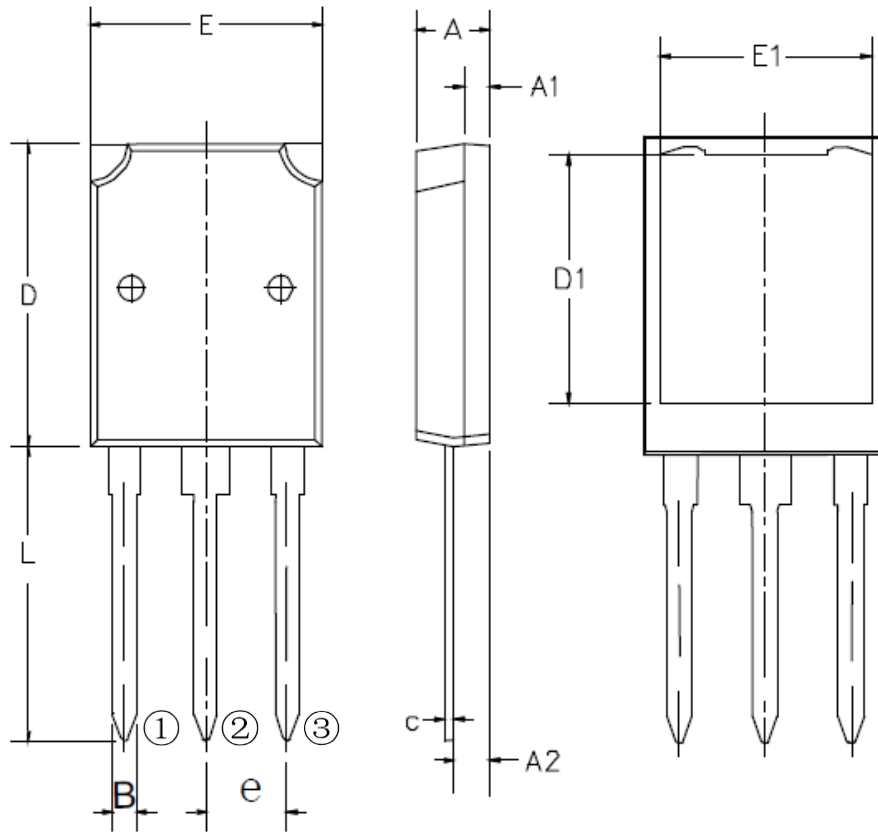


Fig.17 BVCEs Filter Circuit



Package Outline (Unit: mm):



SYMBOL	MIN (mm)	NOM (mm)	MAX (mm)
A	4.92	5.00	5.08
A1	2.27	2.35	2.43
A2	1.92	2.00	2.08
B	1.16	1.20	1.24
C	0.56	0.60	0.64
D	20.70	20.90	21.10
E	15.80	15.90	16.00
E1	13.92	14.02	14.12
e	5.34	5.44	5.54
L	19.70	20.00	20.30

CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER



Revision	Notes
01	Initial Release
02	Update Electrical Parameter Characteristics

Announcement

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The datasheet with “REV.” + “Arabic numerals” is based on engineering data for initial reference purpose only.

The released datasheet would be issued with “REV.” + “alphabet characters”.