



SMGI25H120ADB

1200V 25A Field Stop Trench IGBT

Features:

- Low $V_{CE(sat)}$ Trench IGBT Technology
- Low Switching Loss
- Low Stray Inductance
- Maximum Junction Temperature 175°C
- Positive $V_{CE(sat)}$ Temperature Coefficient

Applications:

- UPS
- Motor Driver

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	$T_C=100^{\circ}\text{C}$	25	A
		$T_C=25^{\circ}\text{C}$	50	A
I_{CM}	Pulse Collector Current		100	A
I_F	Continuous Forward Current	$T_C=100^{\circ}\text{C}$	25	A
		$T_C=25^{\circ}\text{C}$	50	A
I_{FM}	Pulse Forward Current		100	A
t_{sc}	Short Circuit Withstand Time	$V_{CC}=600\text{V}$, $V_{GE}=15\text{V}$ $T_J=150^{\circ}\text{C}$	>10	μs
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	577	W
T_J	Maximum Junction Temperature		-40~175	$^{\circ}\text{C}$
T_{JOP}	Maximum Operating Junction Temperature Range		-40~175	$^{\circ}\text{C}$
	Soldering Temperature, for 10 sec.		260 (0.063 in. (1.6mm) from case)	$^{\circ}\text{C}$



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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
$V_{(BR)CES}$	Collector-to-Emitter Breakdown Voltage	$V_{GE}=0V, I_C=1mA$		1200			V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=1mA, V_{CE}=V_{GE}$		5.0	5.8	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=25A, V_{GE}=15V$	$T_J=25^{\circ}\text{C}$		1.75	2.20	V
			$T_J=125^{\circ}\text{C}$		2.10		V
			$T_J=150^{\circ}\text{C}$		2.20		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V, V_{CE}=V_{CES}, T_J=25^{\circ}\text{C}$				25	μA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 25V, V_{CE}=0V, T_J=25^{\circ}\text{C}$				± 200	nA
C_{ies}	Input Capacitance	$V_{CE}=25V, V_{GE}=0V, f=100kHz$			1.65		nF
C_{oes}	Output Capacitance				0.17		
C_{res}	Reverse Transfer Capacitance				0.02		

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

t _{d(on)}	Turn-on Delay Time	V _{CC} =600V, I _C =25A, R _{Gon} =15Ω, V _{GE} =0/15V, Inductive Load	T _J =25℃		41		ns
			T _J =125℃		44		
			T _J =150℃		47		
t _r	Rise Time		T _J =25℃		47		ns
			T _J =125℃		50		
			T _J =150℃		61		
t _{d(off)}	Turn-off Delay Time	V _{CC} =600V, I _C =25A, R _{Goff} =15Ω, V _{GE} =0/15V, Inductive Load	T _J =25℃		157		ns
			T _J =125℃		163		
			T _J =150℃		168		
t _f	Fall Time		T _J =25℃		197		ns
			T _J =125℃		210		
			T _J =150℃		213		



E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =25A, R _{Gon} =15Ω, V _{GE} =0/15V, di/dt=585A/μs(T _J =150°C), Inductive Load	T _J =25°C		2.44		mJ
			T _J =125°C		2.74		
			T _J =150°C		2.88		
E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =25A, R _{Goff} =15Ω, V _{GE} =0/15V, du/dt=3209V/μs(T _J =150°C), Inductive Load	T _J =25°C		0.82		mJ
			T _J =125°C		1.09		
			T _J =150°C		1.30		
Q _g	Total Gate Charge	V _{CC} =960V, I _C =25A, V _{GE} =0/15V			91		nC
Q _{ge}	Gate-emitter Charge				18		
Q _{gc}	Gate-collector Charge				49		
I _{sc}	V _{CC} =600V, V _{GE} =0/15V, t _p =10μs, T _J =150°C				106		A

Electrical Characteristics of Diode ($T_C=25^\circ C$ unless otherwise specified)

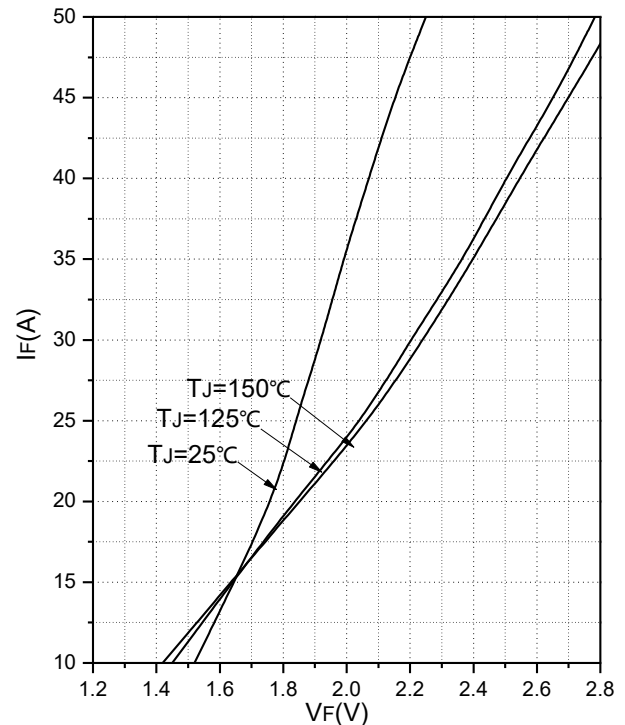
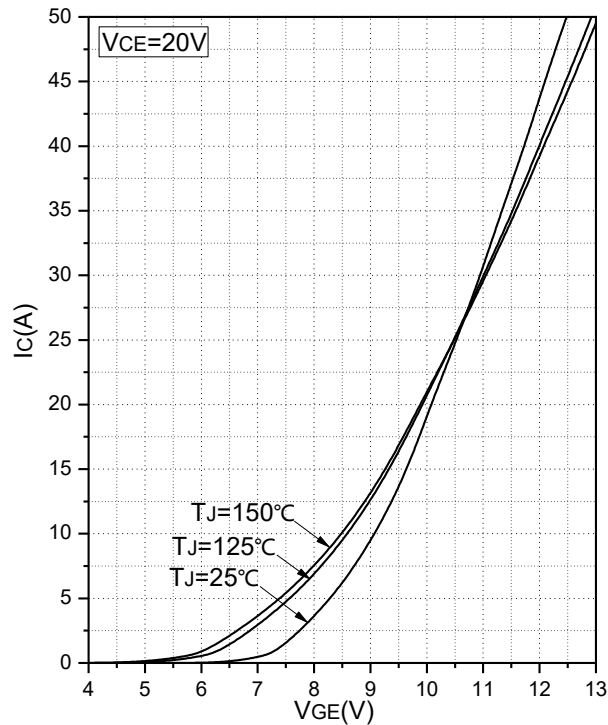
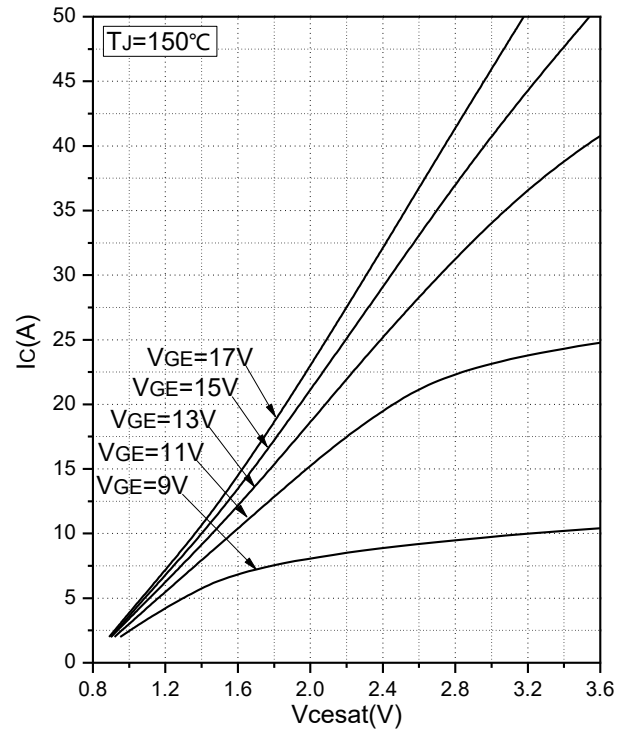
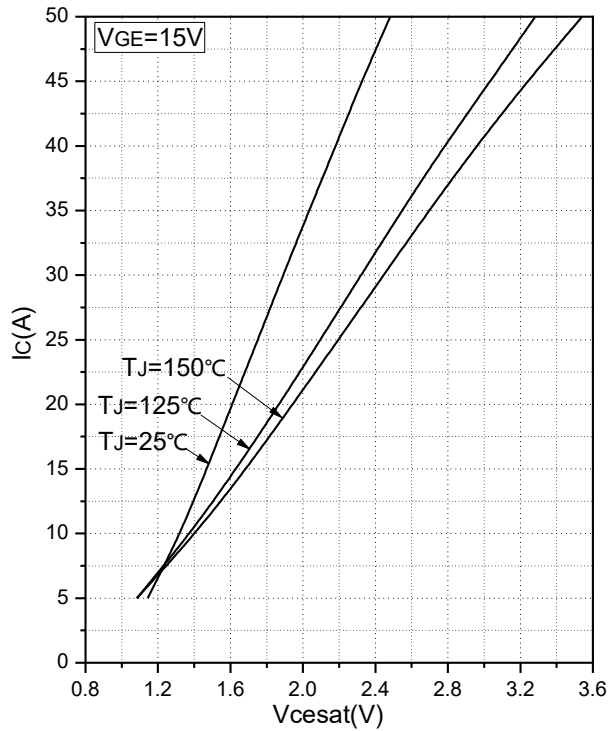
Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =25A	T _J =25℃		1.85		V
			T _J =125℃		2.10		
			T _J =150℃		2.10		
I _{rr}	Peak Reverse Recovery Current	I _F =25A, di/dt=641A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =0V	T _J =25℃		11.6		A
			T _J =125℃		13.4		
			T _J =150℃		14.4		
t _{rr}	Reverse Recovery Time		T _J =25℃		265		ns
			T _J =125℃		312		
			T _J =150℃		315		
dI _{rr} /dt	Peak Rate of Fall of Reverse Recovery Current during t _b		T _J =25℃		60		A/us
			T _J =125℃		55		
			T _J =150℃		45		



Q _{rr}	Reverse Recovery Charge	I _F =25A, di/dt=641A/μs(T _J =150°C), V _{rr} =600V, V _{GE} =0V	T _J =25°C		1.59		μC
			T _J =125°C		1.76		
			T _J =150°C		1.95		
E _{rec}	Reverse Recovery Energy		T _J =25°C		0.68		mJ
			T _J =125°C		0.92		
			T _J =150°C		1.12		

Thermal Characteristics (T_C=25°C unless otherwise specified)

Symbol	Description	Min.	Typ.	Max.	Units
R _{ΘJC} (IGBT)	Thermal Resistance: Junction-to-Case		0.26		°C/W
R _{ΘJC} (Diode)	Thermal Resistance: Junction-to-Case		0.60		°C/W
R _{ΘJA}	Thermal Resistance: Junction-to-Ambient (typical socket mount)			40	°C/W



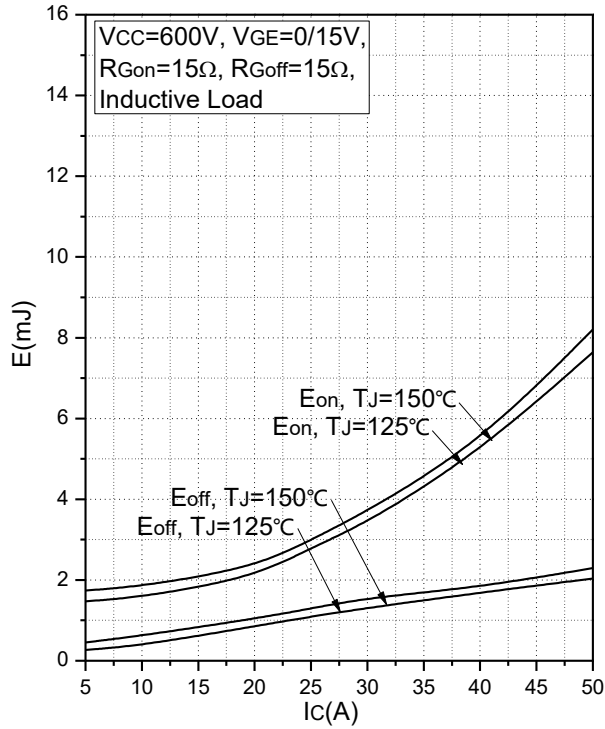


Fig.5 Typical Switching Loss vs. Collector Current

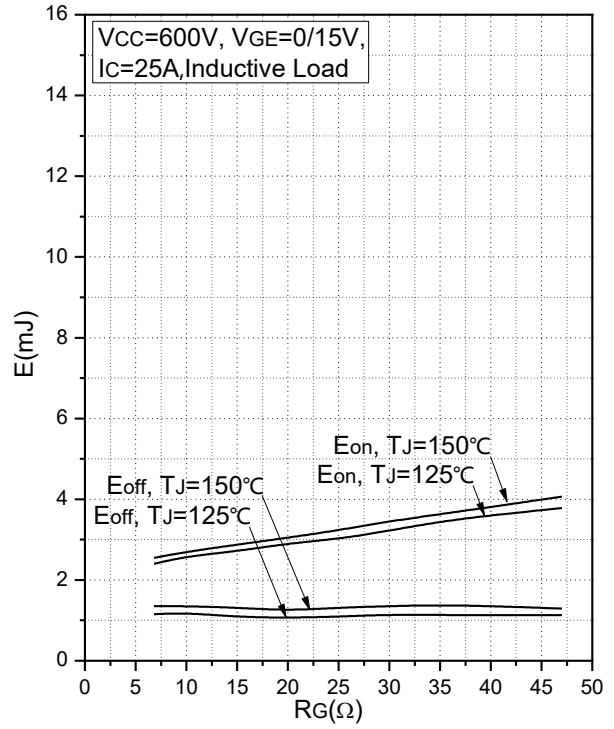


Fig.6 Typical Switching Loss vs. Gate Resistance

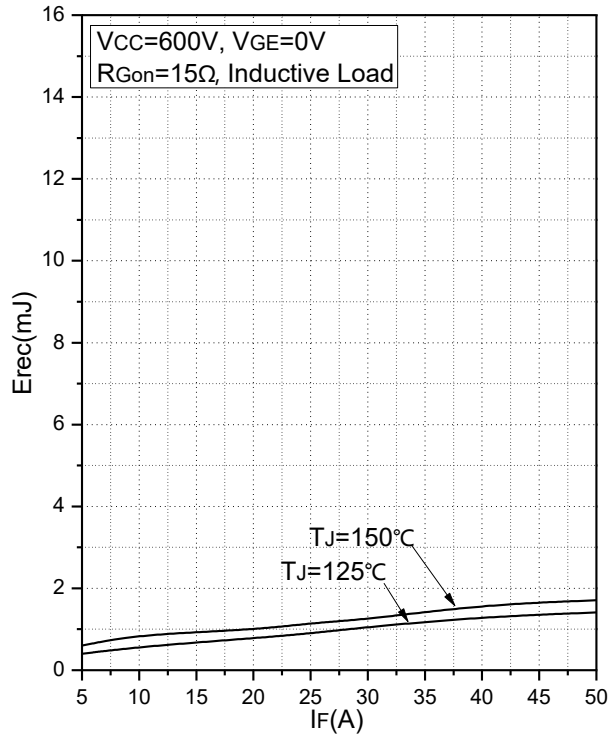


Fig.7 Typical Switching Loss vs. Forward Current

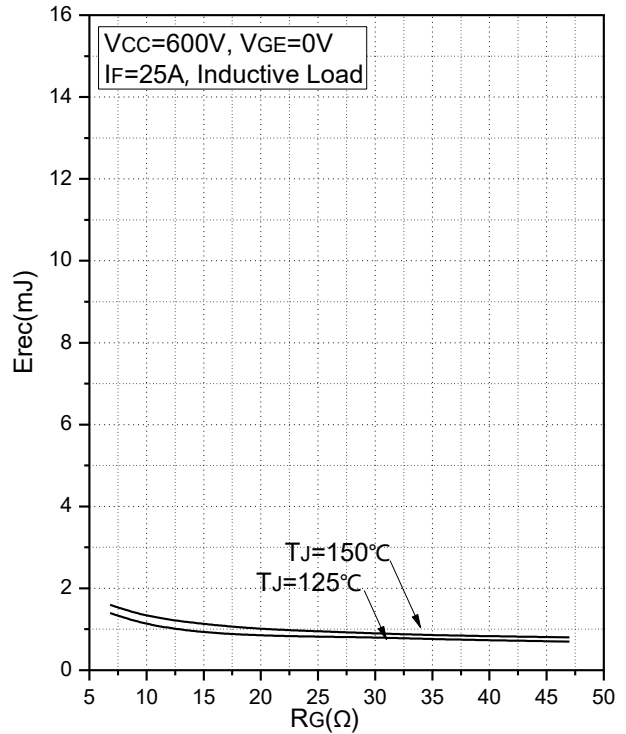
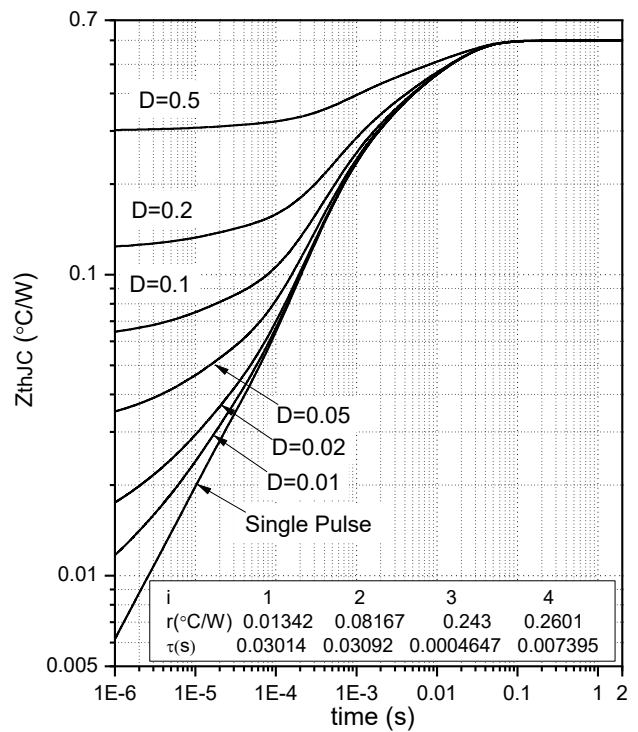
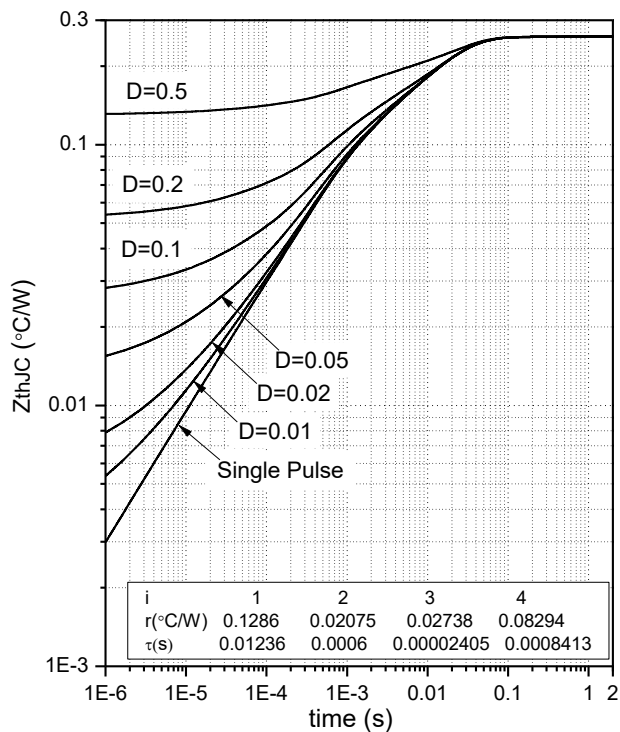
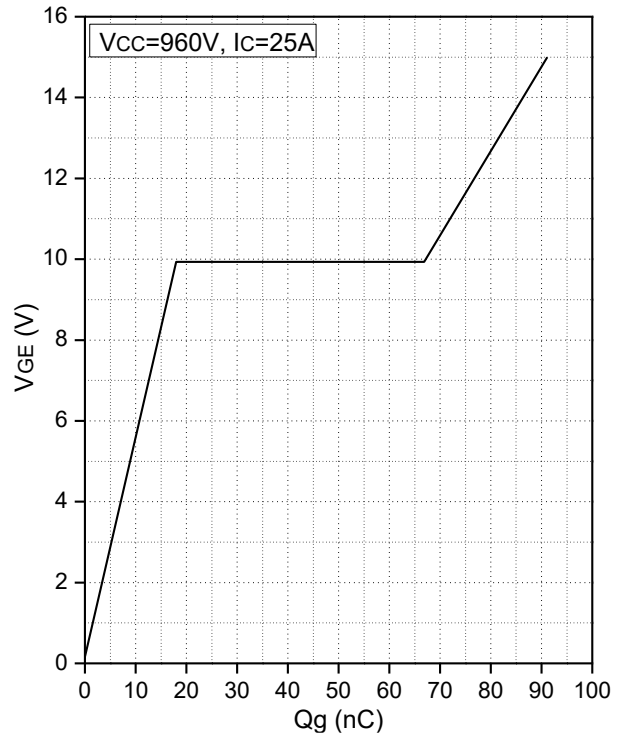
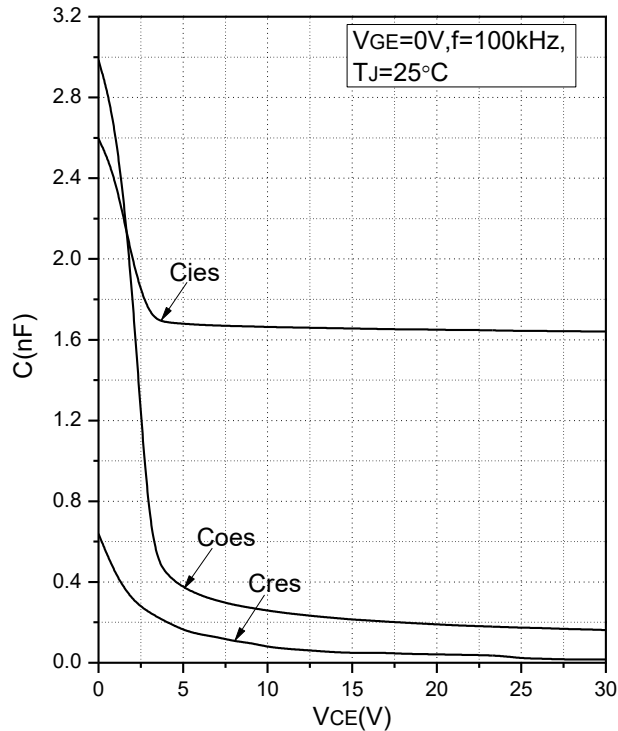


Fig.8 Typical Switching Loss vs. Gate Resistance



Test Circuit:

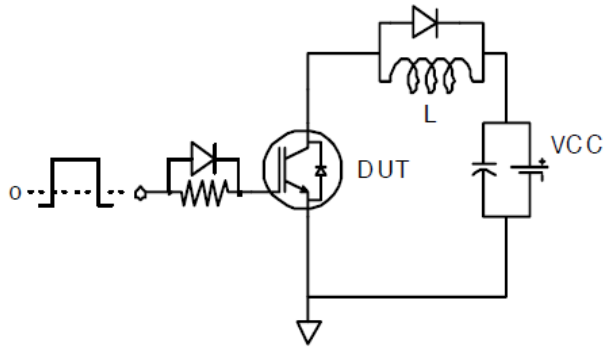


Fig.13 Gate Charge Circuit (turn-off)

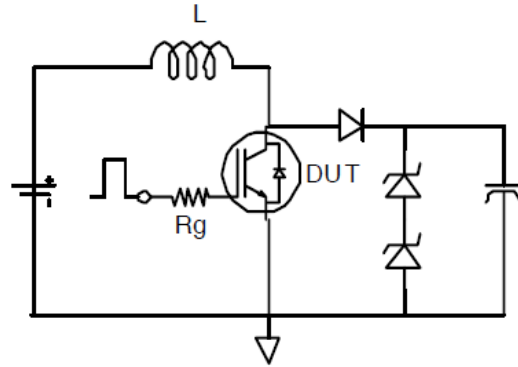


Fig.14 RBSOA Circuit

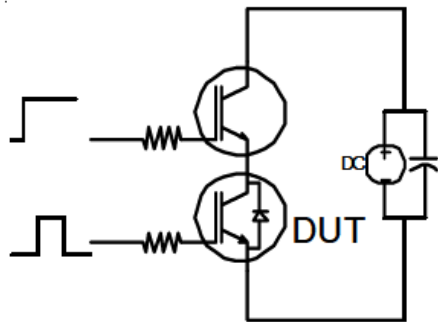


Fig.15 S.C. SOA Circuit

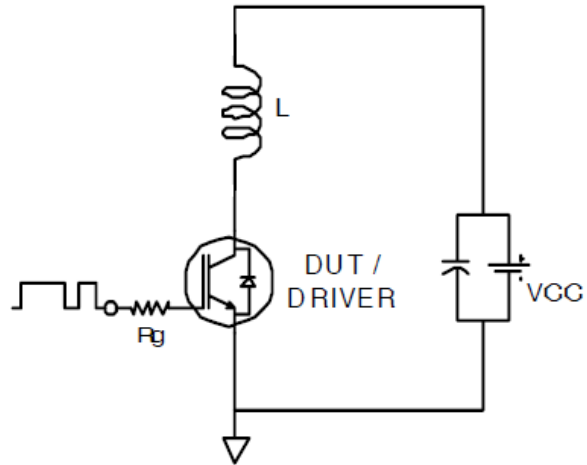


Fig.16 Switching Loss Circuit

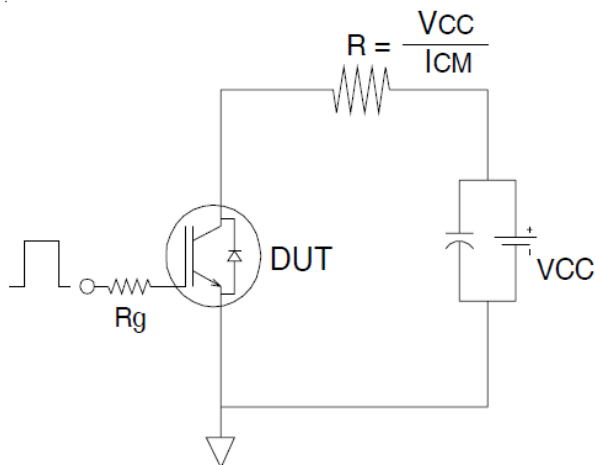


Fig.17 Resistive Load Circuit

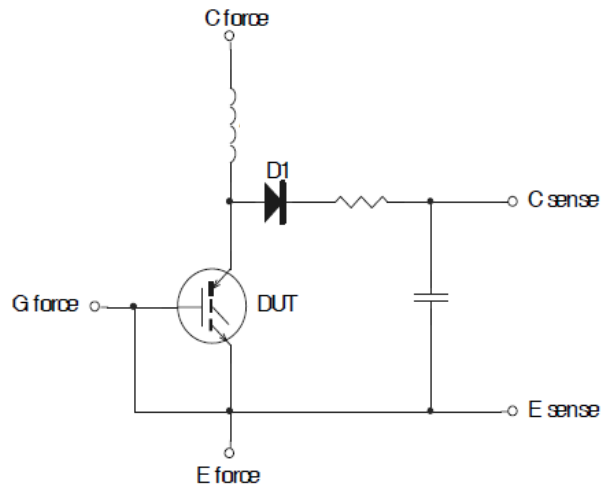
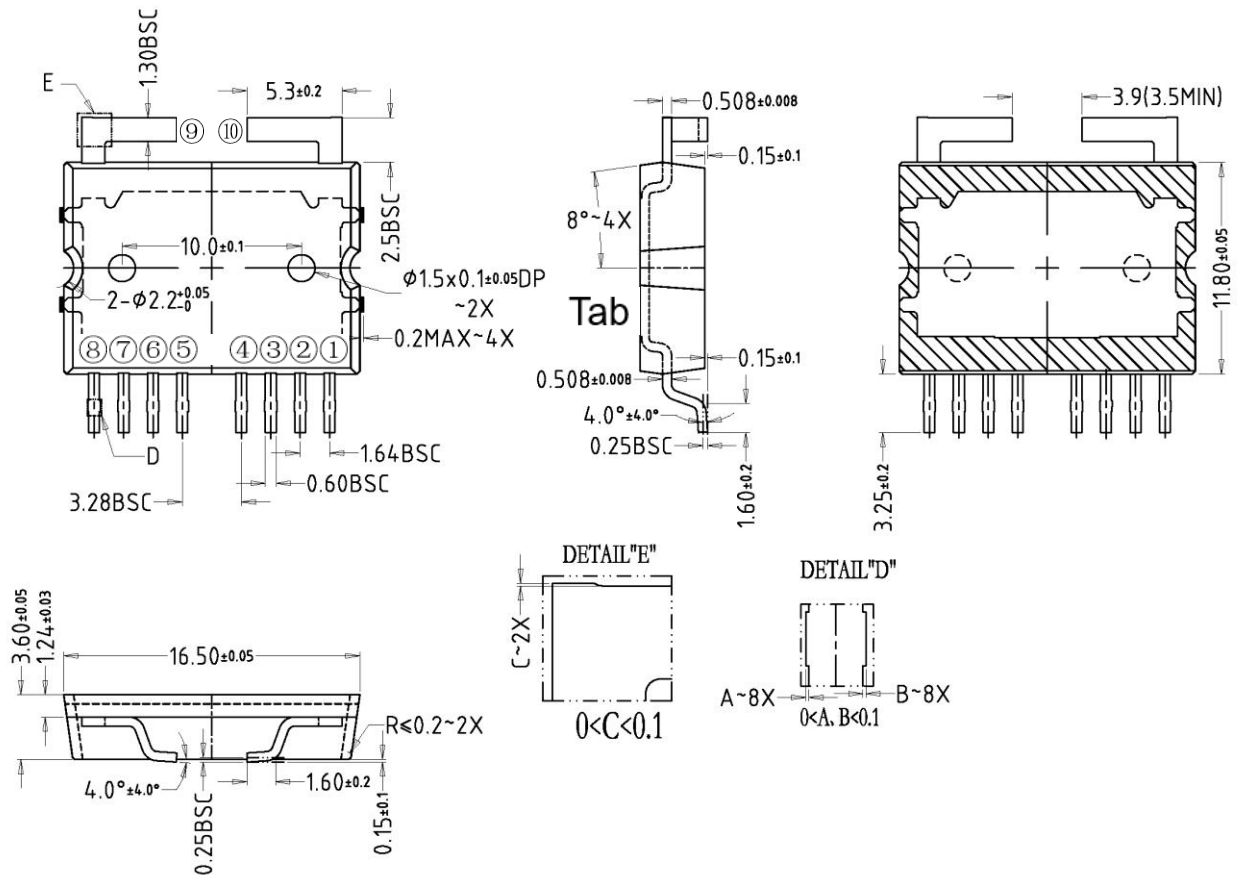


Fig.18 BVCEs Filter Circuit



IP-8L Package Outline (Unit: mm):



CONNECTION

- ① GATE
- ② KELVIN EMITTER
- ③ ... ⑧ EMITTER
- ⑨/⑩/Tab COLLECTOR



Revision	Notes
01	Initial Release
02	Updated Outline
03	Update Electrical Characteristics and Curves
A	Final Version

Announcement

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