



SMGW75H65ADB

650V 75A Field Stop Trench IGBT

Preliminary Data

Features:

- Low $V_{CE(sat)}$ Trench IGBT Technology
- Low Switching Loss
- Maximum Junction Temperature 175°C
- Positive $V_{CE(sat)}$ Temperature Coefficient
- Fast and Soft Reverse Recovery Anti-parallel FWD
- Lead Free, Compliant with RoHS Requirement

Applications:

- UPS
- Power Quality
- Motor Drive

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

Symbol	Description	Conditions	Values	Units
V_{CES}	Collector-Emitter Blocking Voltage		650	V
V_{GES}	Continuous Gate-Emitter Voltage		± 20	V
	Transient Gate-Emitter Voltage		± 30	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, t_P limited by T_{Jmax}		300	A
I_F	Continuous Forward Current	$T_C=100^{\circ}\text{C}$	75	A
		$T_C=25^{\circ}\text{C}$	150	A
I_{FP}	Pulse Forward Current, t_P limited by T_{Jmax}		300	A
t_{sc}	Short Circuit Withstand Time	$V_{CC}\leq 400\text{V}$, $V_{GE}=15\text{V}$ $T_J=150^{\circ}\text{C}$	5	μs
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	TBD	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)	°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	$V_{GE}=0V$, $I_C=250\mu A$	650			V
$V_{GE(th)}$	Gate-Emitter Threshold Voltage	$I_C=250\mu A$, $V_{CE}=V_{GE}$	4.5	5.6	6.5	V
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C=75A$, $V_{GE}=15V$	$T_J=25^{\circ}\text{C}$	1.65	1.90	V
			$T_J=125^{\circ}\text{C}$	1.95		V
I_{CES}	Collector-Emitter Leakage Current	$V_{GE}=0V$, $V_{CE}=V_{CES}$			1	mA
I_{GES}	Gate-Emitter Leakage Current	$V_{GE}=\pm 20V$, $V_{CE}=0V$			± 200	nA
g_{FS}	Forward Transconductance	$V_{CE}=20V$, $I_C=75A$		TBD		S

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
C _{ies}	Input Capacitance	V _{CE} =25V, V _{GE} =0V, f=100kHz			TBD		pF
C _{oes}	Output Capacitance				TBD		pF
C _{res}	Reverse Transfer Capacitance				TBD		pF
Q _G	Total Gate Charge	V _{CC} =520V, V _{GE} =0/15V, I _C =75A			TBD		nC
Q _{GE}	Gate-Emitter Charge				TBD		nC
Q _{GC}	Gate-Collector Charge				TBD		nC
t _{d(on)}	Turn-on Delay Time	V _{CC} =400V, I _C =75A, R _{Gon} =6.8Ω, V _{GE} =0/15V, Inductive Load	T _J =25℃		130		ns
			T _J =125℃		153		
t _r	Rise Time		T _J =25℃		100		ns
			T _J =125℃		106		



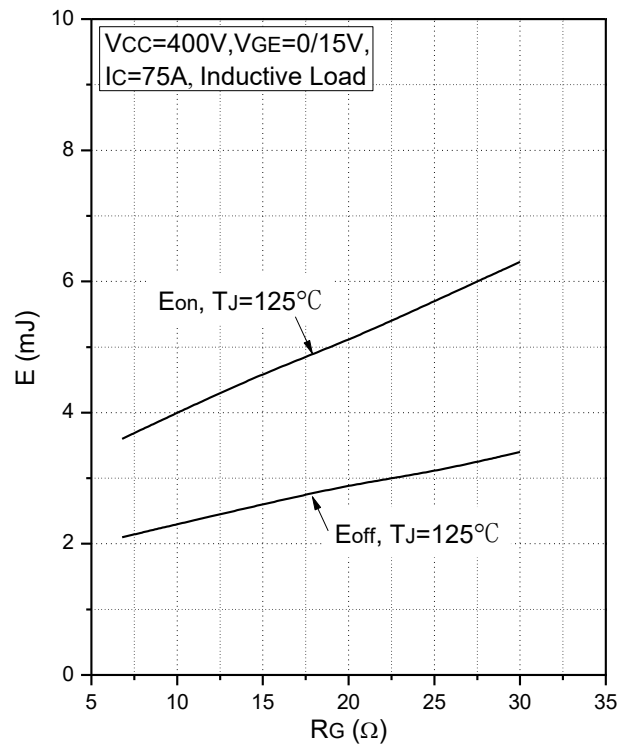
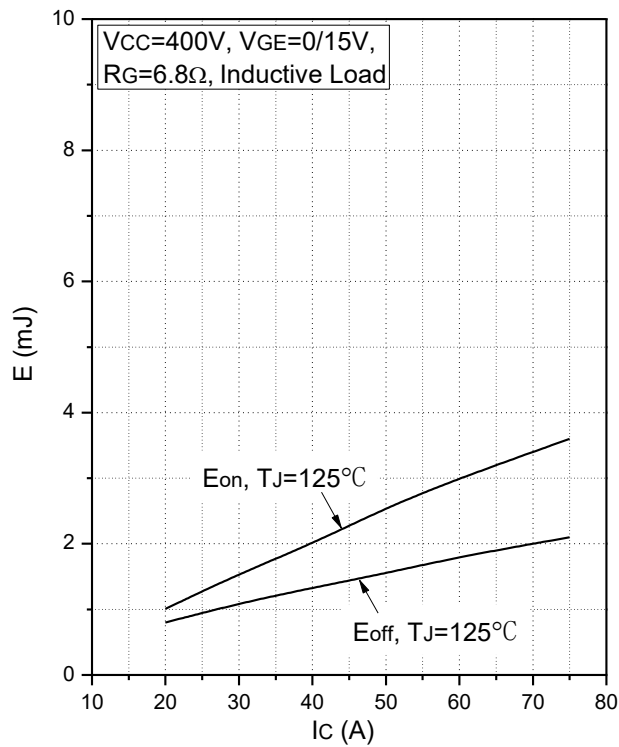
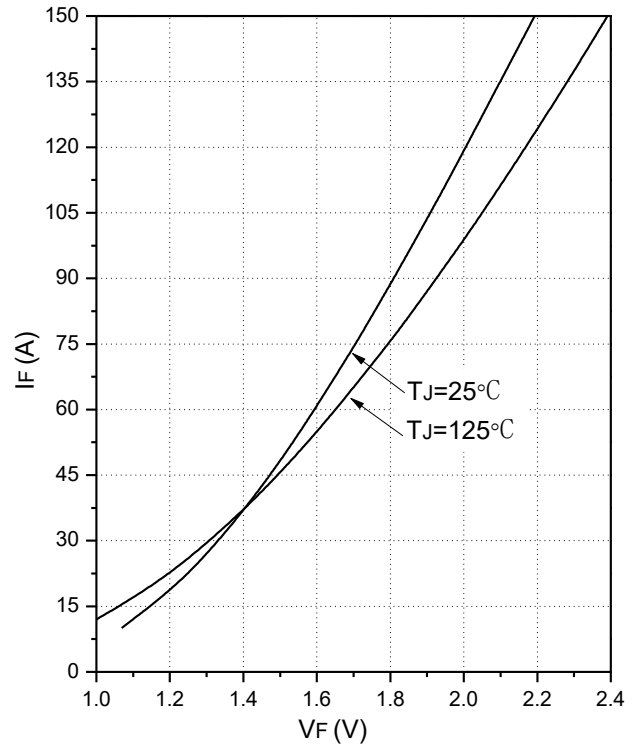
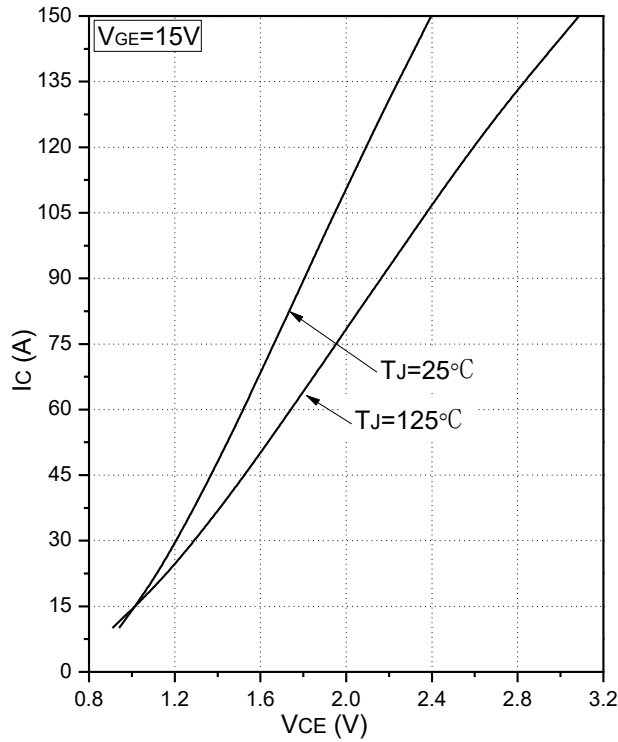
$t_{d(off)}$	Turn-off Delay Time	$V_{CC}=400V, I_C=75A,$ $R_{Goff}=6.8\Omega, V_{GE}=0/15V,$ Inductive Load	$T_J=25^{\circ}C$		99		ns
			$T_J=125^{\circ}C$		129		
t_f	Fall Time		$T_J=25^{\circ}C$		168		ns
			$T_J=125^{\circ}C$		169		
E_{on}	Turn-on Switching Loss	$V_{CC}=400V, I_C=75A,$ $R_{Gon}=6.8\Omega, V_{GE}=0/15V,$ $di/dt= \textit{tbd A}/\mu s(T_J=125^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		3.4		mJ
			$T_J=125^{\circ}C$		3.6		
E_{off}	Turn-off Switching Loss	$V_{CC}=400V, I_C=75A,$ $R_{Goff}=6.8\Omega, V_{GE}=0/15V,$ $du/dt= \textit{tbd V}/\mu s(T_J=125^{\circ}C),$ Inductive Load	$T_J=25^{\circ}C$		1.9		mJ
			$T_J=125^{\circ}C$		2.1		
$R_{G(int)}$	Internal Gate Resistance			1.7			Ω
I_{sc}	$V_{CC}=400V, V_{GE}=0/15V, tp=5\mu s, T_J=150^{\circ}C$				TBD		A

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

Symbol	Description	Conditions		Min.	Typ.	Max.	Units	
V _{FM}	Diode Forward Voltage	I _F =75A, T _J =25℃			1.70	2.20	V	
		I _F =75A, T _J =125℃			1.80		V	
t _{rr}	Reverse Recovery Time	V _{rr} =400V, I _F =75A, -diF/dt= <i>tbd</i> A/μs (T _J =125℃)	T _J =25℃		108		ns	
			T _J =125℃		136			
I _{rr}	Peak Reverse Recovery Current		T _J =25℃		23		A	
			T _J =125℃		42			
Q _{rr}	Reverse Recovery Charge		T _J =25℃		1.3		μC	
			T _J =125℃		3.0			
E _{rec}	Reverse Recovery Energy		T _J =25℃		0.28		mJ	
			T _J =125℃		0.36			

Thermal Characteristics ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC(IGBT)}$	Thermal Resistance: Junction-to-Case		TBD		$^\circ C/W$
$R_{\theta JC(Diode)}$	Thermal Resistance: Junction-to-Case		TBD		$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance: Junction-to-Ambient (typical socket mount)			40	$^\circ C/W$



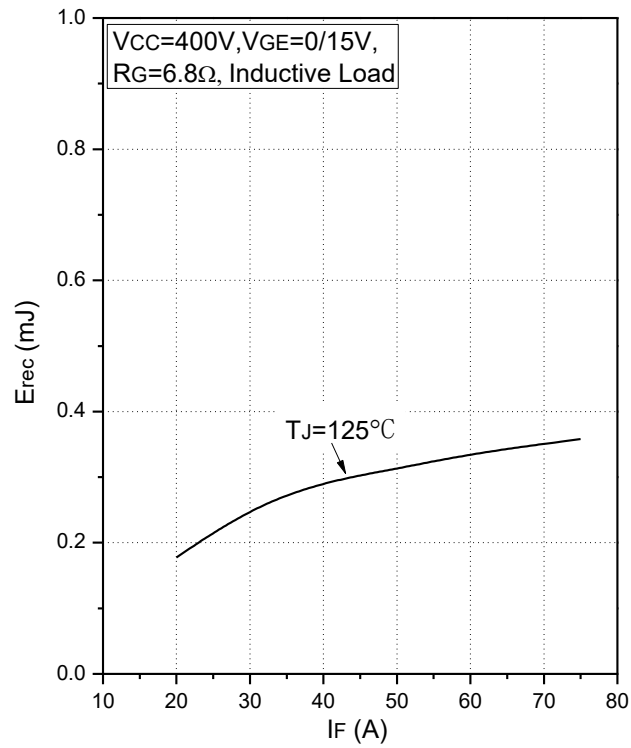


Fig.5 Typical Switching Loss vs. Forward Current

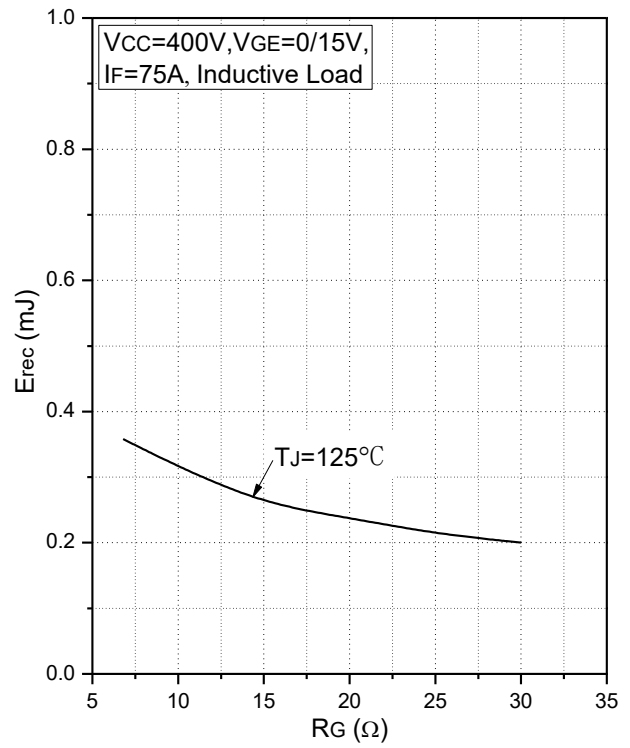


Fig.6 Typical Switching Loss vs. Gate Resistance



Test Circuit:

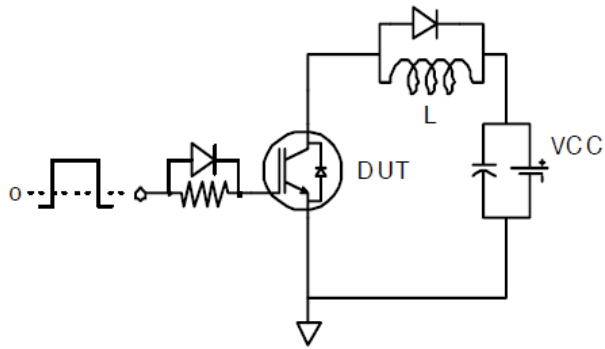


Fig.7 Gate Charge Circuit (turn-off)

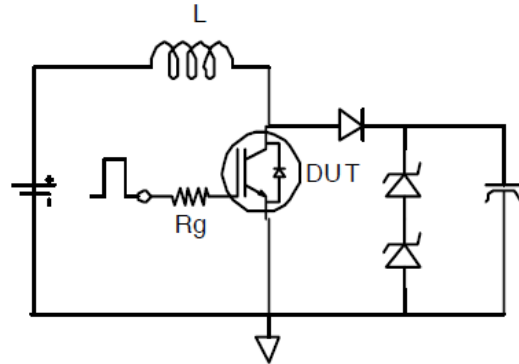


Fig.8 RBSOA Circuit

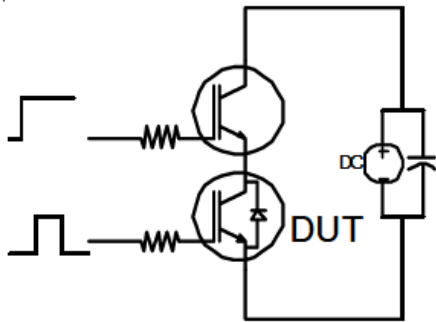


Fig.9 S.C. SOA Circuit

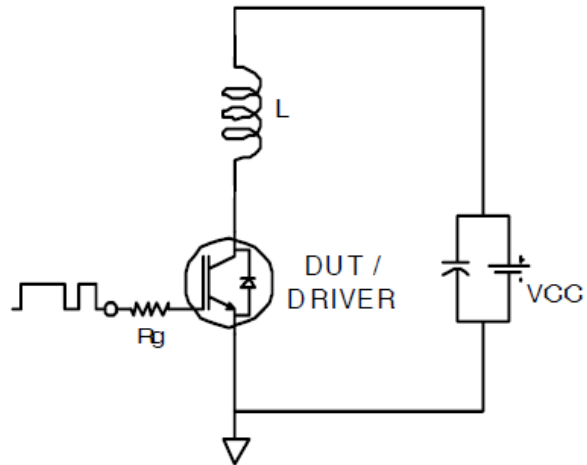


Fig.10 Switching Loss Circuit

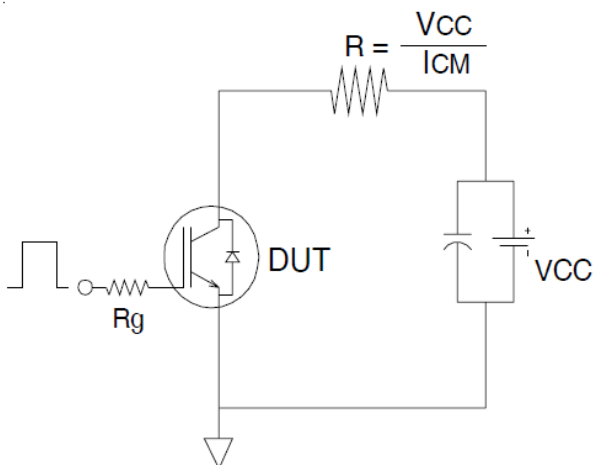


Fig.11 Resistive Load Circuit

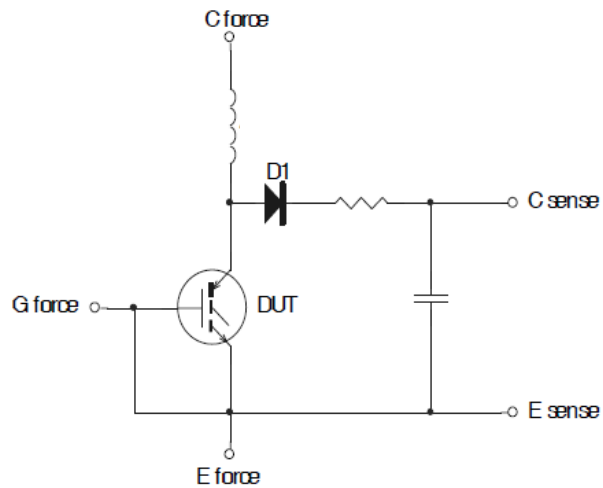
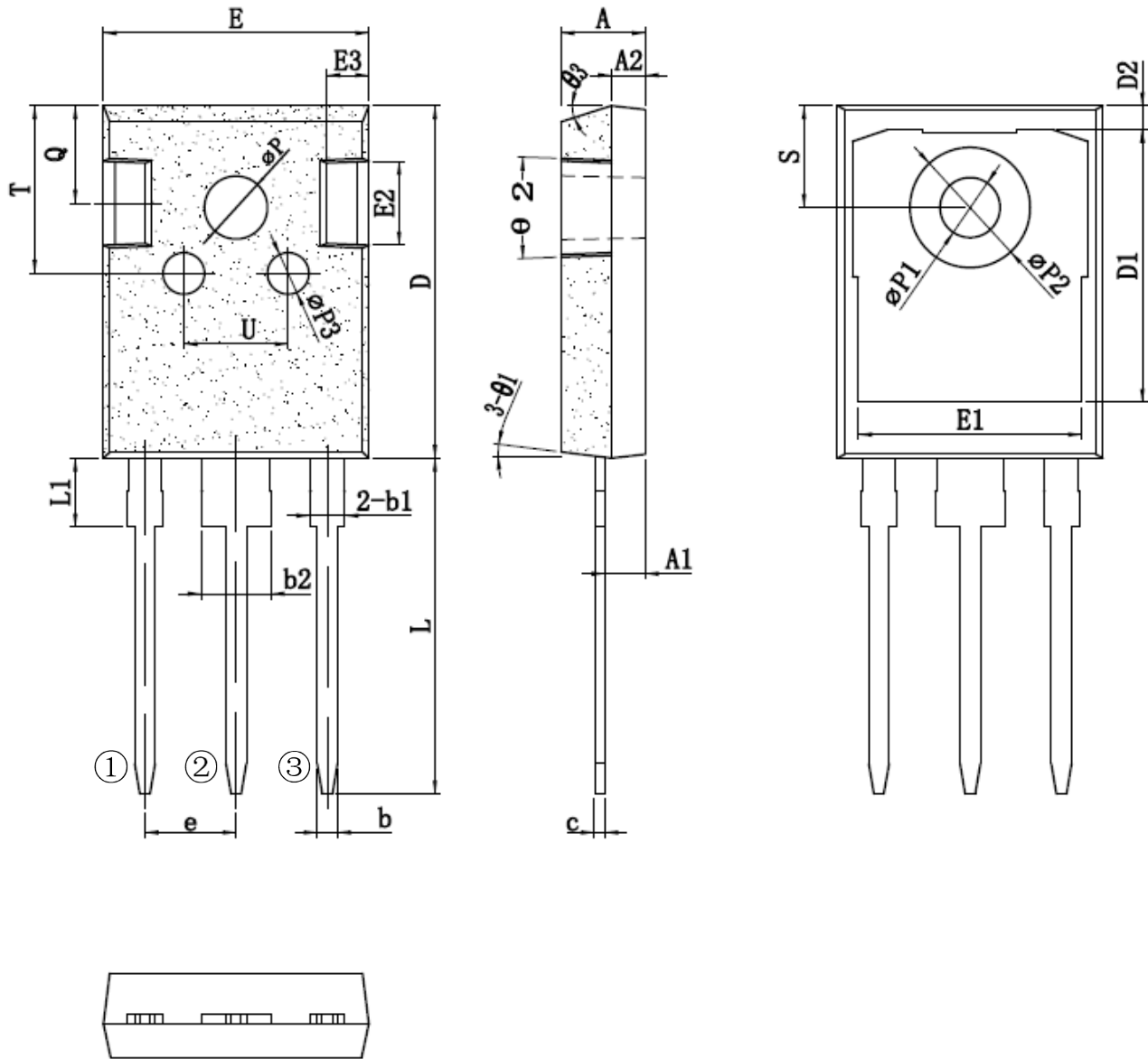


Fig.12 BVCES Filter Circuit



TO-247 Package Outline (Unit: mm):



CONNECTION

- ① GATE
- ② COLLECTOR
- ③ EMITTER



TO-247 Package Mechanical Data:

SYMBOL	mm		
	MIN	NOM	MAX
*A	4.90	5.00	5.10
*A1	2.31	2.41	2.51
A2	1.90	2.00	2.10
*b	1.15	1.20	1.25
*b1	1.95	2.10	2.25
*b2	2.95	3.10	3.25
*c	0.55	0.60	0.65
*D	20.90	21.00	21.10
D1	16.35	16.55	16.75
D2	1.05	1.20	1.35
*E	15.70	15.80	15.90
E1	13.10	13.25	13.40
E2	4.90	5.00	5.10
E3	2.40	2.50	2.60
*e	5.40	5.44	5.48
*L	19.80	19.98	20.15
*L1	—	—	4.30
*ΦP	3.60	3.70	3.80
*ΦP1	3.45	3.55	3.65
ΦP2	7.03	7.18	7.33
ΦP3	2.40	2.50	2.60
Q	5.60	5.80	6.00
*S	6.05	6.15	6.25
T	9.80	10.00	10.20
U	6.00	6.20	6.40
θ1	5°	7°	9°
θ2	1°	3°	5°
θ3	13°	15°	17°



Revision	Notes
01	Initial Release

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”.