

SYD40H120ADB

1200V 40A 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
- Lead Free, Compliant with RoHS Requirement

Applications:

- Welder
- UPS
- Solar Inverter

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	$T_C=100^{\circ}\text{C}$	40	A
		$T_C=25^{\circ}\text{C}$	80	A
I_{CM}	Pulse Collector Current	$T_J=175^{\circ}\text{C}$	80	A
I_F	Continuous Forward Current	$T_C=100^{\circ}\text{C}$	40	A
		$T_C=25^{\circ}\text{C}$	80	A
I_{FM}	Pulse Forward Current	$T_J=175^{\circ}\text{C}$	80	A
P_D	Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	470	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.	300 (0.063 in. (1.6mm) from case)	°C
	Mounting Torque, 6-32 or M3 Screw	10 lbf·in (1.1 N·m)	

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	$V_{GE}=0V$, $I_C=250\mu A$	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	$I_C=40A$, $V_{GE}=15V$	$T_J=25^{\circ}\text{C}$	1.80		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	$V_{GE}=0V$, $V_{CE}=V_{CES}$, $T_J=25^{\circ}\text{C}$			1	mA
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	$V_{CE}=25V$, $V_{GE}=0V$, $f=100kHz$		3.45		nF
C_{oes}	Output Capacitance			0.51		
C_{res}	Reverse Transfer Capacitance			0.04		

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

$t_{d(on)}$	Turn-on Delay Time	$V_{CC}=600V, I_C=40A,$ $R_{Gon}=15\Omega, V_{GE}=\pm 15V,$ Inductive Load	$T_J=25^{\circ}C$		92		ns
			$T_J=125^{\circ}C$		93		
			$T_J=150^{\circ}C$		94		
t_r	Rise Time		$T_J=25^{\circ}C$		46		ns
			$T_J=125^{\circ}C$		50		
			$T_J=150^{\circ}C$		51		
$t_{d(off)}$	Turn-off Delay Time	$T_J=25^{\circ}C$		183		ns	
		$T_J=125^{\circ}C$		185			
		$T_J=150^{\circ}C$		189			
t_f	Fall Time	$T_J=25^{\circ}C$		258		ns	
		$T_J=125^{\circ}C$		310			
		$T_J=150^{\circ}C$		315			

E _{on}	Turn-on Switching Loss	V _{CC} =600V, I _C =40A, R _{Gon} =15Ω, V _{GE} =±15V, di/dt=719A/μs(T _J =150°C), Inductive Load	T _J =25°C		2.48		mJ
			T _J =125°C		2.68		
			T _J =150°C		3.05		
E _{off}	Turn-off Switching Loss	V _{CC} =600V, I _C =40A, R _{Goff} =15Ω, V _{GE} =±15V, du/dt=2879V/μs(T _J =150°C), Inductive Load	T _J =25°C		3.21		mJ
			T _J =125°C		3.77		
			T _J =150°C		4.07		
Q _g	Total Gate Charge	V _{CC} =600V, I _C =40A, V _{GE} =-15V...+15V			313		nC
Q _{ge}	Gate-emitter Charge				60		
Q _{gc}	Gate-collector Charge				150		
SCSOA	V _{CC} =600V, V _{GE} =±15V, R _G =15Ω, T _J =25°C			10			μs

Electrical Characteristics of Diode (T_C=25°C unless otherwise specified)

Symbol	Description	Conditions		Min.	Typ.	Max.	Units
V _{FM}	Forward Voltage	I _F =40A	T _J =25℃		1.80	2.00	V
			T _J =125℃		1.90		
			T _J =150℃		2.00		
I _{rr}	Peak Reverse Recovery Current	I _F =40A, di/dt=833A/μs(T _J =150℃), V _{rr} =600V, V _{GE} =-15V	T _J =25℃		53.7		A
			T _J =125℃		62.5		
			T _J =150℃		63.8		
t _{rr}	Reverse Recovery Time		T _J =25℃		164		ns
			T _J =125℃		186		
			T _J =150℃		187		
Q _{rr}	Reverse Recovery Charge		T _J =25℃		4.53		μC
			T _J =125℃		6.31		
			T _J =150℃		6.54		
E _{rec}	Reverse Recovery Energy		T _J =25℃		1.96		mJ
			T _J =125℃		2.64		
			T _J =150℃		2.75		



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

Symbol	Description	Min.	Typ.	Max.	Units
$R_{\theta JC(\text{IGBT})}$	Thermal Resistance: Junction-to-Case			0.32	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC(\text{Diode})}$	Thermal Resistance: Junction-to-Case			0.52	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance: Junction-to-Ambient (typical socket mount)			40	$^{\circ}\text{C}/\text{W}$

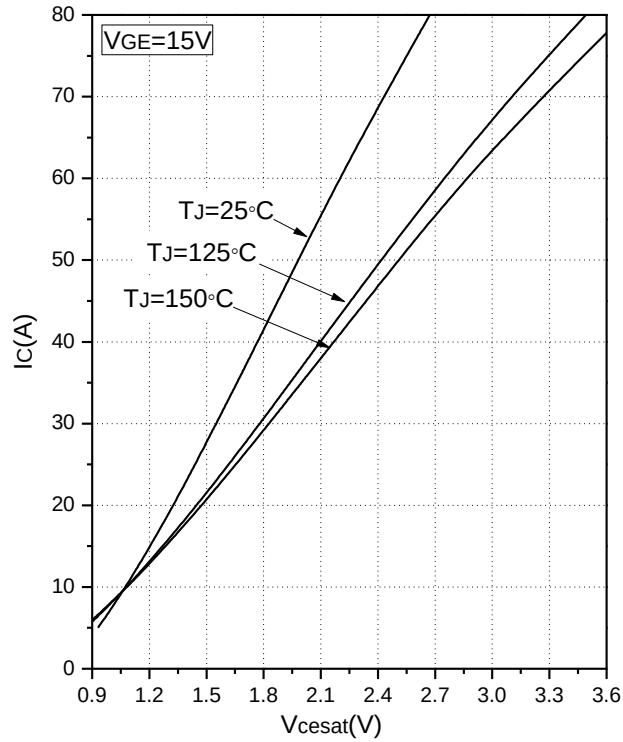


Fig.1 Typical Saturation Voltage Characteristics

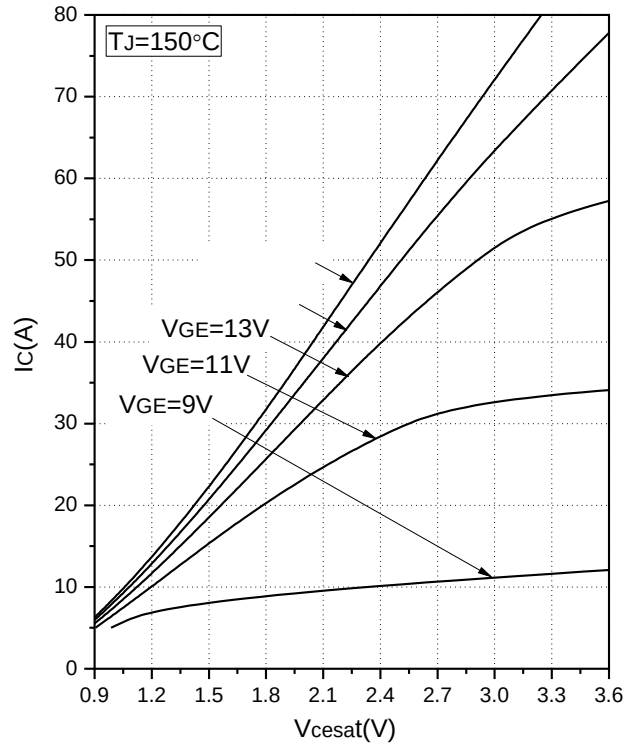


Fig.2 Typical Output Characteristics

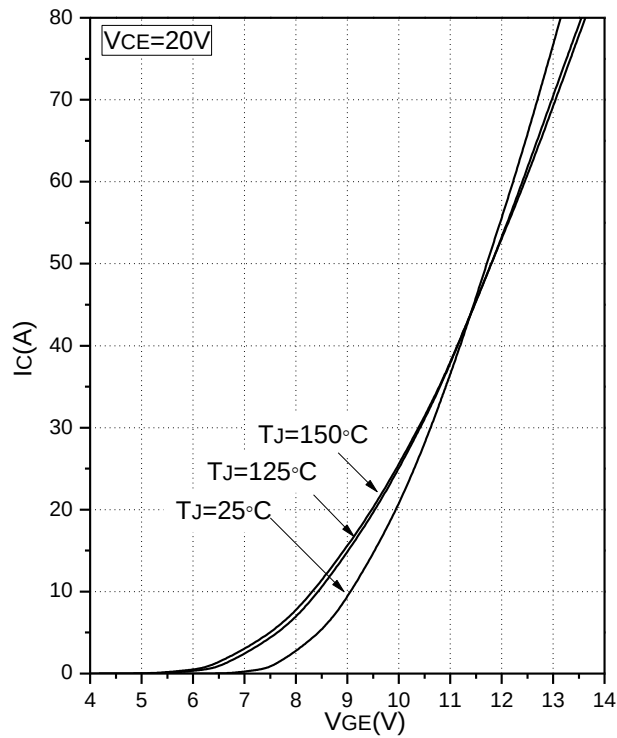


Fig.3 Transfer Characteristic

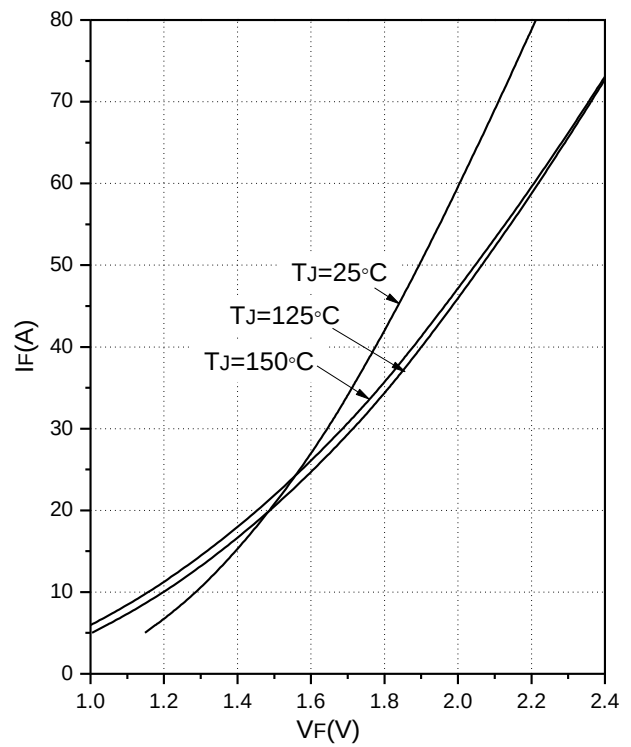


Fig.4 Forward Characteristics of Diode

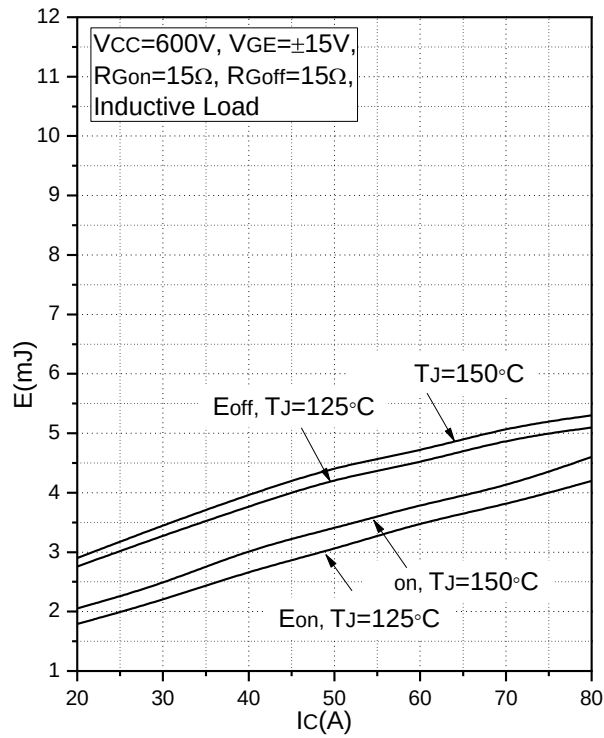


Fig.5 Typical Switching Loss vs. Collector Current

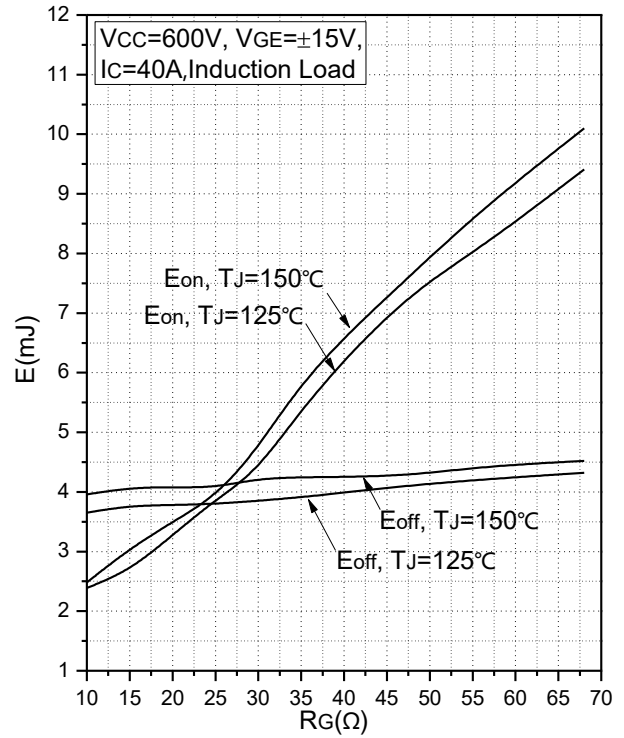


Fig.6 Typical Switching Loss vs. Gate Resistance

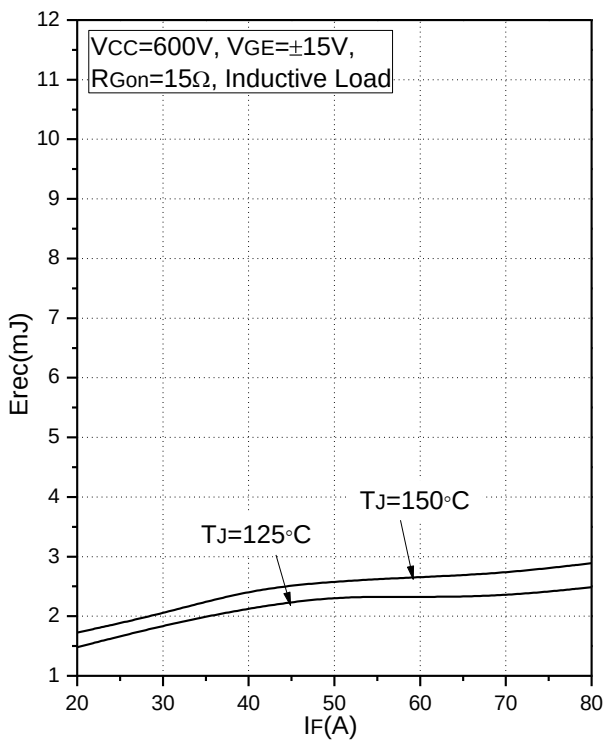


Fig.7 Typical Switching Loss vs. Forward Current

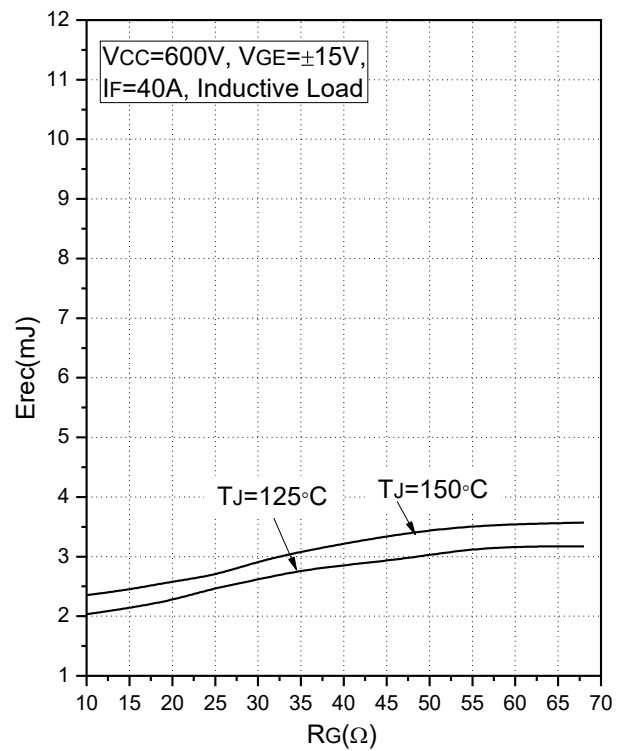


Fig.8 Typical Switching Loss vs. Gate Resistance

Test Circuit:

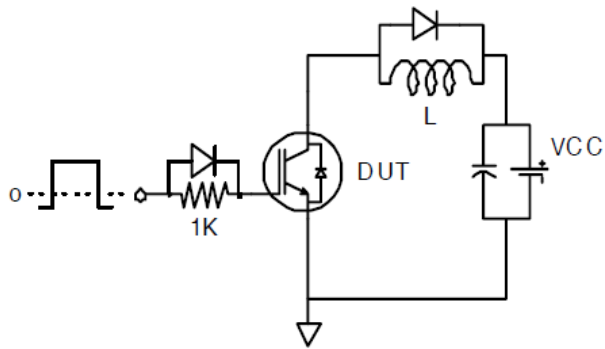


Fig.9 Gate Charge Circuit (turn-off)

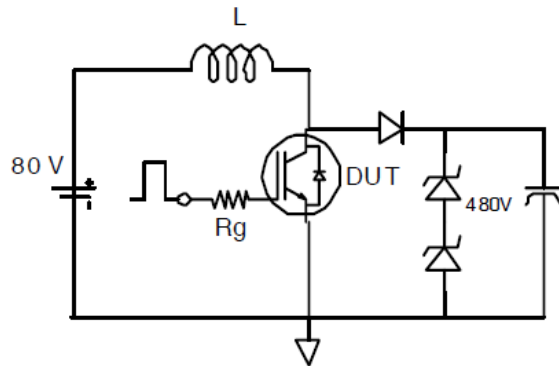


Fig.10 RBSOA Circuit

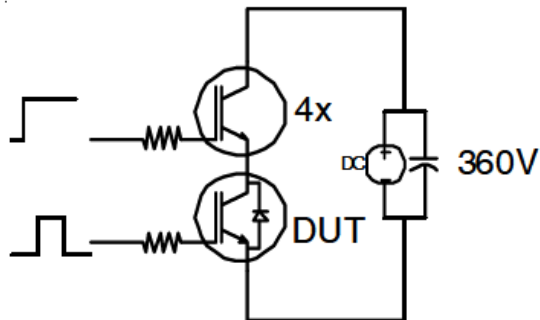


Fig.11 S.C. SOA Circuit

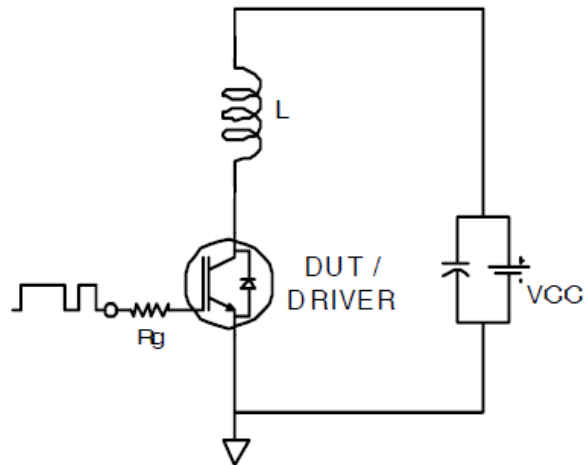


Fig.12 Switching Loss Circuit

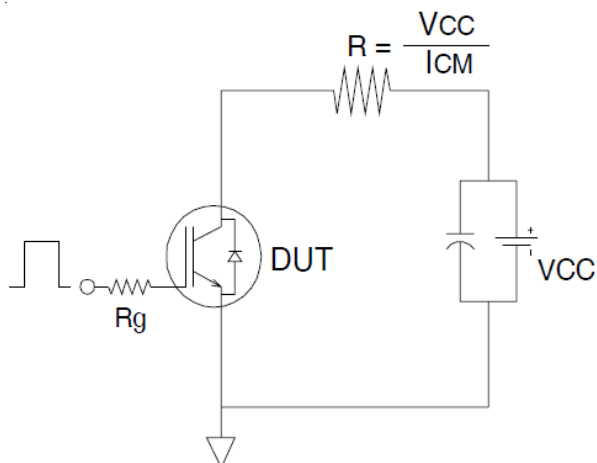


Fig.13 Resistive Load Circuit

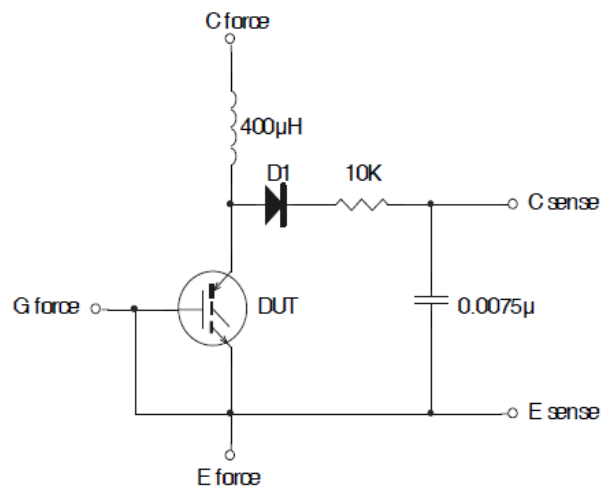
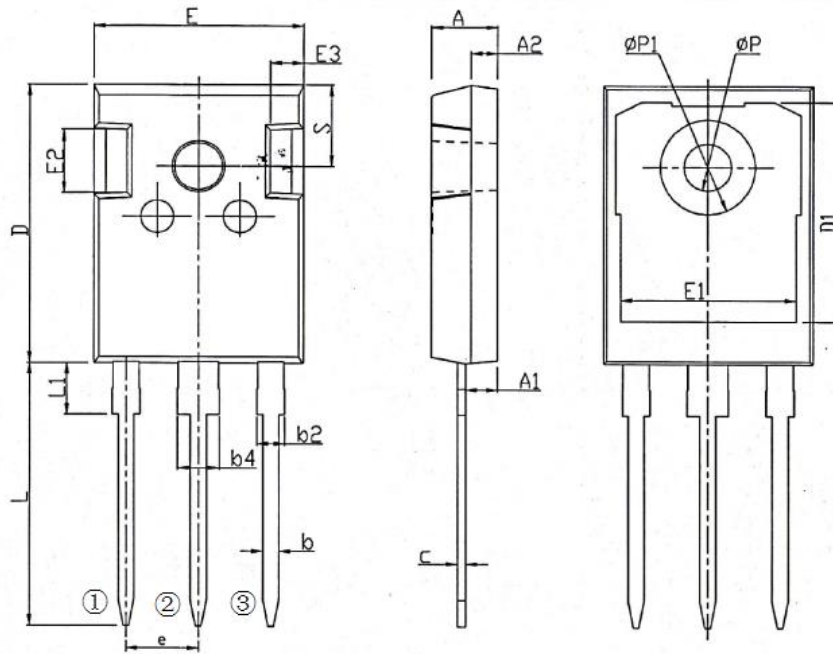


Fig.14 BVCES Filter Circuit

TO-247 Package Outline (Unit: mm):



CONNECTION
 ① GATE
 ② COLLECTOR
 ③ EMITTER

COMMON DIMENSION			
SYMBOL	mm		
	MIN.	NOM.	MAX.
A	4.80	5.00	5.20
A1	2.21	2.41	2.61
A2	1.85	2.00	2.15
b	1.11	1.21	1.36
b2	1.91	2.01	2.21
b4	2.91	3.01	3.21
c	0.51	0.61	0.75
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
E	15.50	15.80	16.10
E1	13.00	13.30	13.60
E2	4.80	5.00	5.20
E3	2.30	2.50	2.70
e	5.44BSC		
L	19.62	19.92	20.22
L1	-	-	4.30
ϕP	3.40	3.60	3.80
$\phi P1$	-	-	7.30
S	6.15BSC		