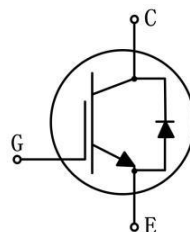


Trench Field-stop IGBT Discrete

Parameter	Value	Unit
V_{CE}	1200	V
I_C	25	A
$V_{CE(sat)}$	1.65	V



TO-247-3L

Features

- Low Switching Losses
- $V_{CE(sat)}$ with Positive Temperature Coefficient
- Pb-free Lead Plating; RoHS Compliant

Applications

- General Purpose Inverters
- Industrial Power Supplies
- Motor Drives

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Collector-emitter voltage	V_{CES}	1200	V
Gate-emitter voltage	V_{GES}	± 20	V
Continuous collector current($T_C=25^\circ\text{C}$)	I_C	50	A
Continuous collector current($T_C=100^\circ\text{C}$)		25	A
Pulsed collector current	I_{CM}	100	A
Diode continuous forward current($T_C=100^\circ\text{C}$)	I_F	25	A
Diode maximum current	I_{FM}	100	A
Short circuit withstand time	t_{SC}	10	μs
Power dissipation($T_C=25^\circ\text{C}$)	P_{tot}	326	W
Operating junction temperature range	T_J	-40 to 175	$^\circ\text{C}$
Storage temperature range	T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal resistance,junction to case for IGBT	$R_{th(j-c)}$	0.46	$^\circ\text{C/W}$
Thermal resistance,junction to case for Diode	$R_{th(j-c)}$	0.88	$^\circ\text{C/W}$
Thermal resistance,junction to ambient	$R_{th(j-a)}$	40	$^\circ\text{C/W}$

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

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	$V_{GE}=0V, I_C=1mA$	1200	---	---	V
Collector-Emitter Leakage Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	---	---	100	μA
Gate Leakage Current, Forward	I_{GES}	$V_{GE}=20V, V_{CE}=0V$	---	---	100	nA
Gate Leakage Current, Reverse		$V_{GE}=-20V, V_{CE}=0V$	---	---	-100	nA
Gate Threshold Voltage	$V_{GE(th)}$	$V_{GE}=V_{CE}, I_C=1mA$	5.0	5.8	6.6	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=25A$	---	1.65	2.1	V
Short circuit collector current	I_{SC}	$V_{CC}=600V, V_{GE}=15V$ $t_{SC} \leq 10\mu s$	---	150	---	A
Total Gate Charge	Q_G	$V_{CC}=960V, V_{GE}=15V$ $I_C=25A$	---	80	---	nC
Turn-on Delay Time	$t_{d(on)}$	$V_{CC}=600V$ $I_C=25A$ $R_G=10\Omega$ Inductive Load $T_C=25^\circ\text{C}$	---	28	---	ns
Turn-on Rise Time	t_r		---	30	---	ns
Turn-off Delay Time	$t_{d(off)}$		---	136	---	ns
Turn-off Fall Time	t_f		---	204	---	ns
Turn-on Switching Loss	E_{on}		---	1.56	---	mJ
Turn-off Switching Loss	E_{off}		---	1.55	---	mJ
Total switching energy	E_{total}		---	3.11	---	mJ
Input Capacitance	C_{ies}	$V_{CE}=25V$ $V_{GE}=0V$ $f=1MHz$	---	2460	---	pF
Output Capacitance	C_{oes}		---	70	---	pF
Reverse Transfer Capacitance	C_{res}		---	27	---	pF

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

Parameter	Symbol	Conditions	Value			Unit
			Min.	Typ.	Max.	
Diode forward voltage	V_F	$I_F=25A, T_{vj}=25^\circ\text{C}$	---	1.9	2.4	V
Diode reverse recovery time	t_{rr}	$V_R=600V$	---	112	---	ns
Diode peak reverse recovery current	I_{rr}	$I_F=25A$	---	21	---	A
Diode reverse recovery charge	Q_{rr}	$diF/dt=700A/\mu s$	---	1800	---	nC

Typical Characteristics

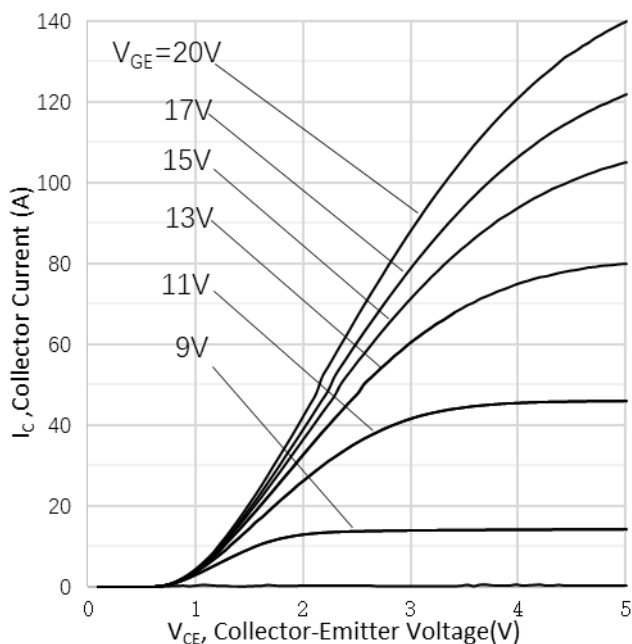


Fig. 1 Typical IGBT output characteristics at $T_j = 25^\circ\text{C}$

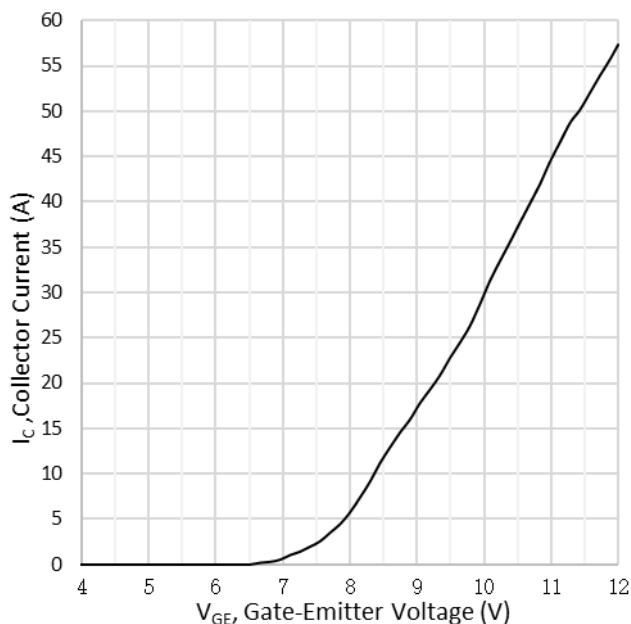


Fig. 2 Typical transfer characteristics at $V_{CE} = 20\text{V}$

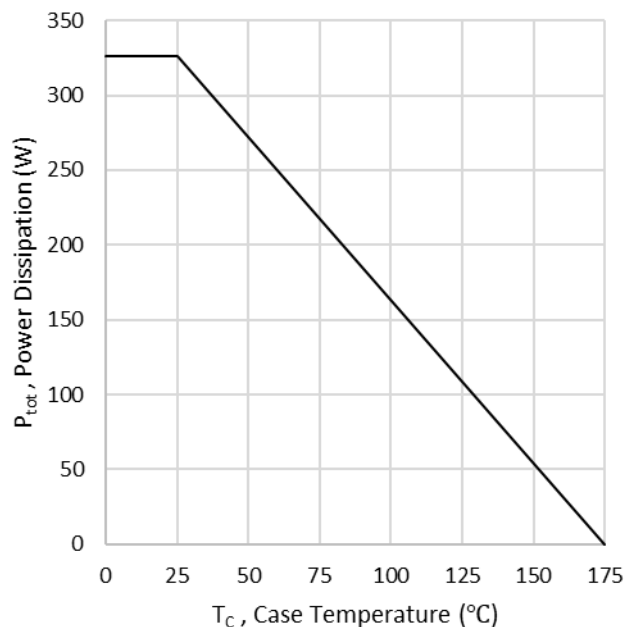


Fig. 3 Power dissipation as a function of case temperature ($T_{vj} \leq 175^\circ\text{C}$)

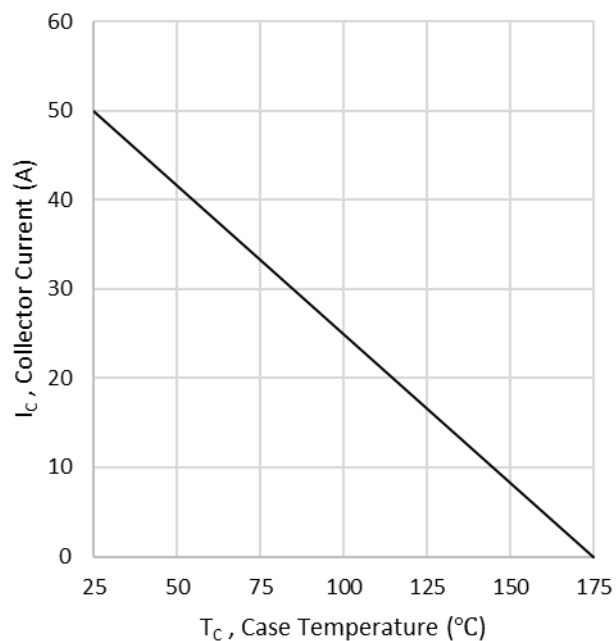


Fig. 4 Collector current as a function of case temperature ($V_{GE} \geq 15\text{V}$, $T_{vj} \leq 175^\circ\text{C}$)

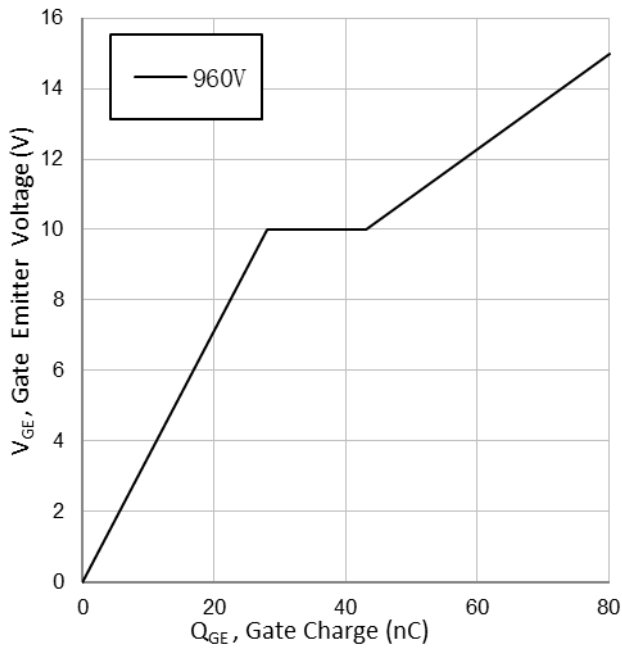


Fig. 5 Typical gate charge ($I_c=25A$)

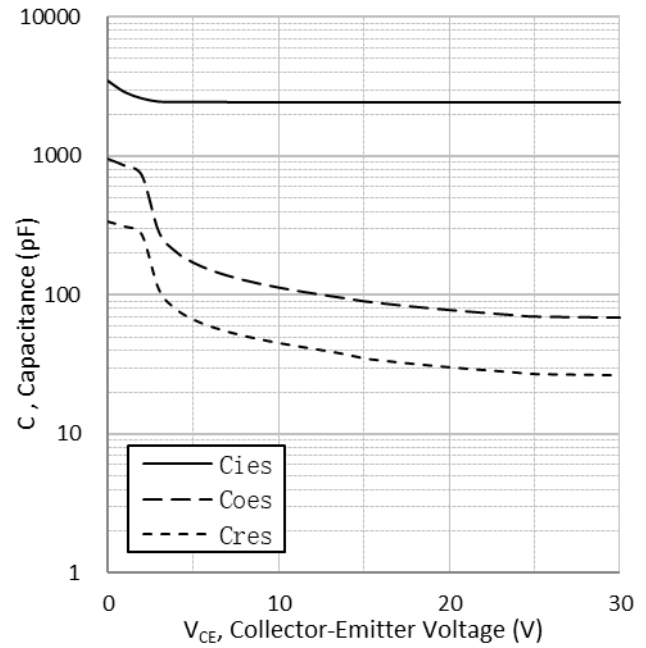


Fig. 6 Typical capacitance as a function of collector-emitter voltage ($V_{GE}=0V$, $f=1MHz$)

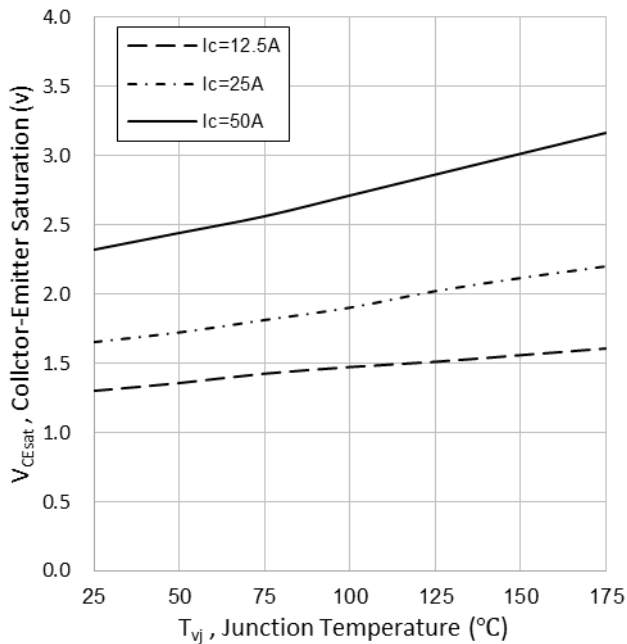


Fig. 7 Typical collector-emitter saturation voltage as a junction temperature ($V_{GE}=15V$)

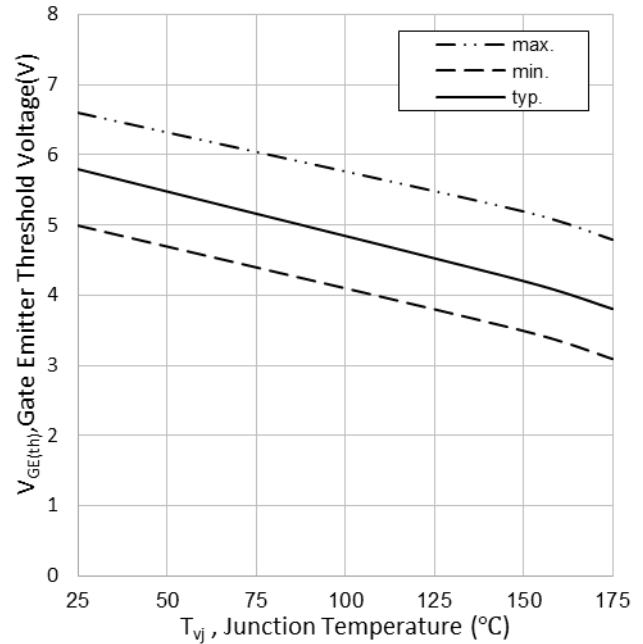


Fig. 8 Gate-emitter threshold voltage as a function of junction temperature ($I_c = 500\mu A$)

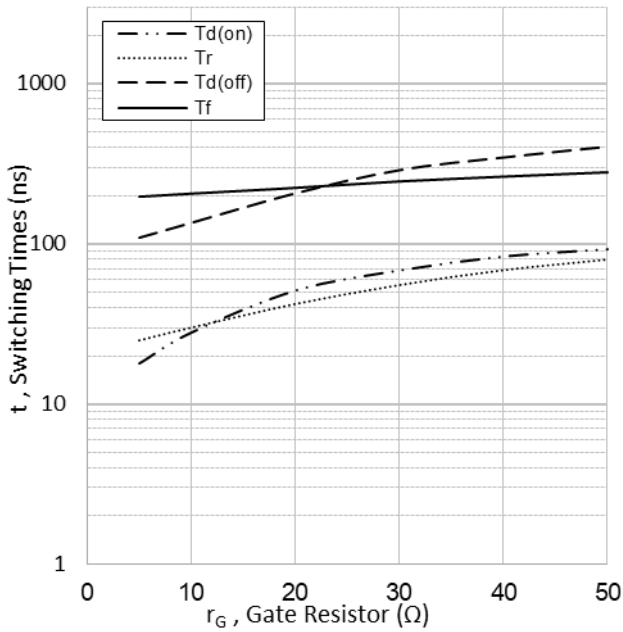


Fig. 9 Typical switching times as a function of gate resistor

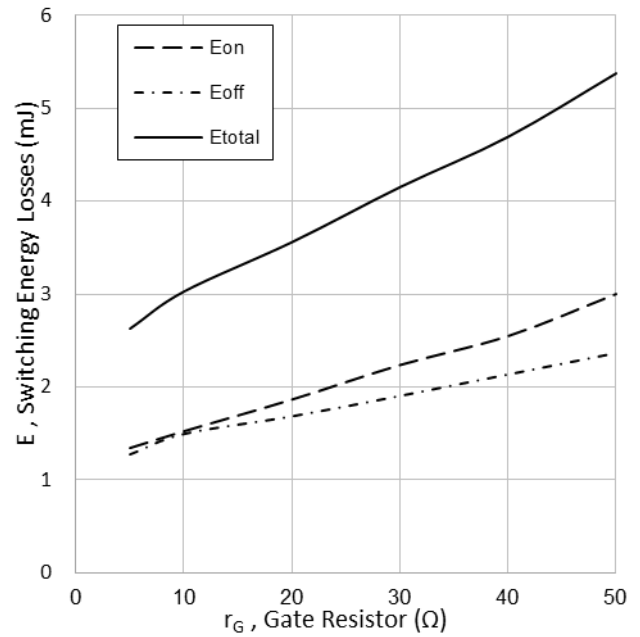


Fig. 10 Typical switching energy losses as a function of gate resistor ($V_{GE}=0V$, $f=1MHz$)

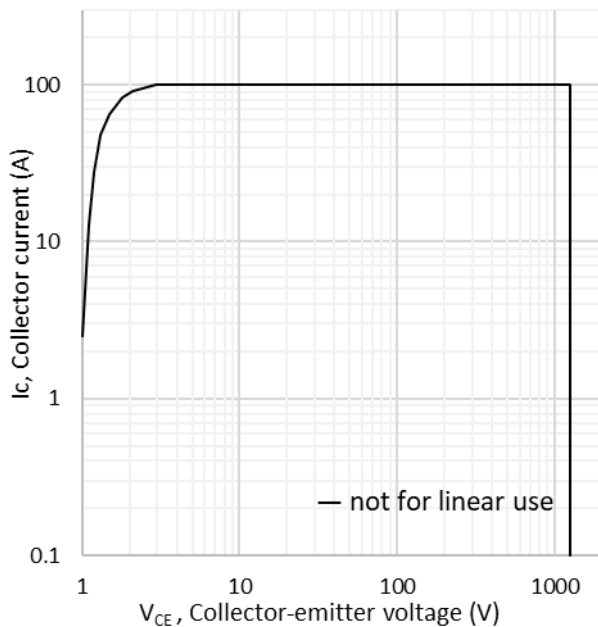


Fig. 11 Forward bias safe operating area
($D=0$, $T_c=25^\circ C$, $T_{vj}\leq 175^\circ C$; $V_{GE}=15V$.)

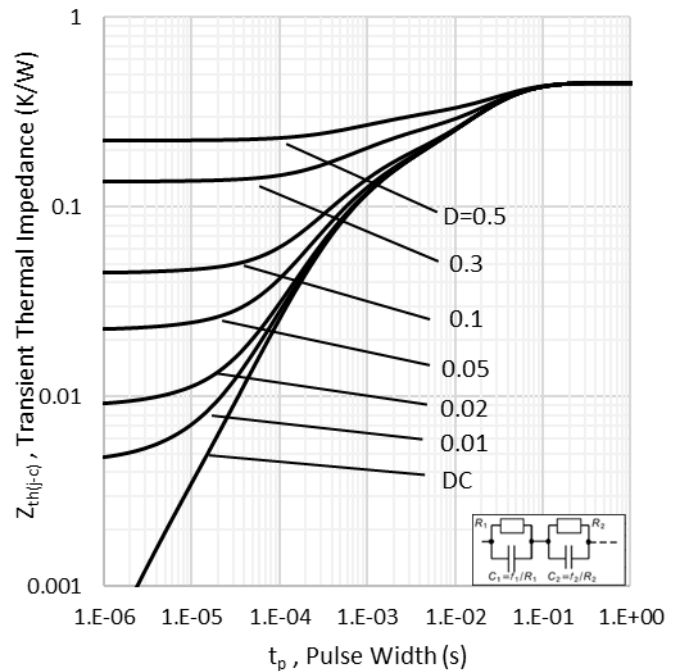


Fig. 12 IGBT transient thermal impedance ($D=t_p/T$)

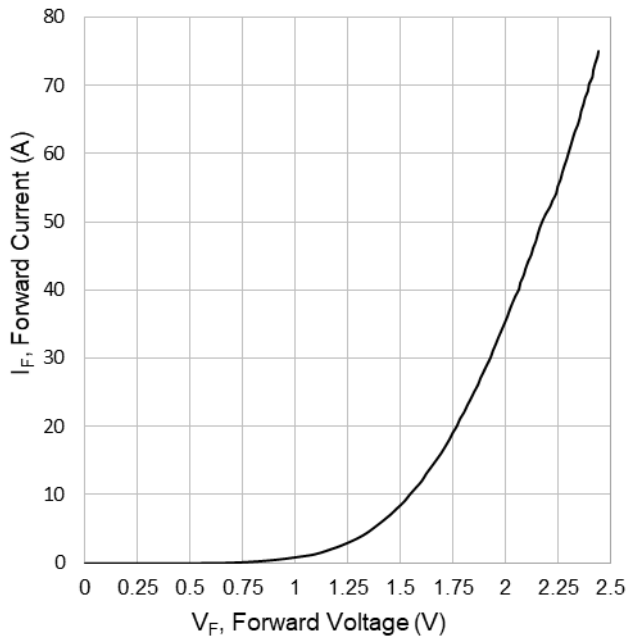


Fig. 13 Typical diode forward current as a function of forward voltage

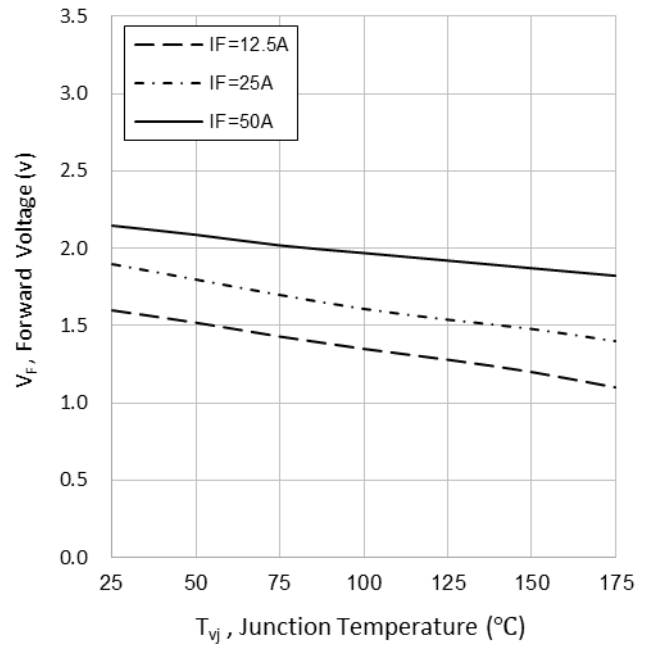
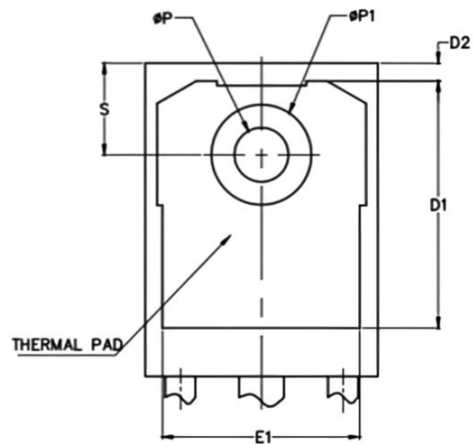
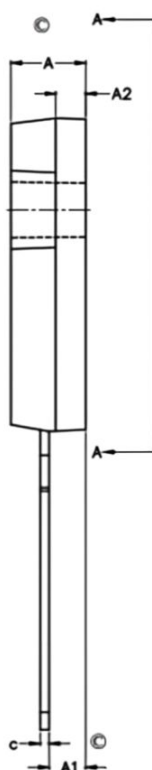
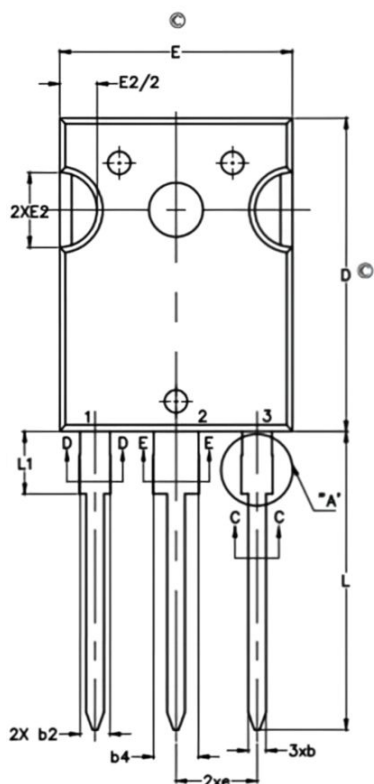


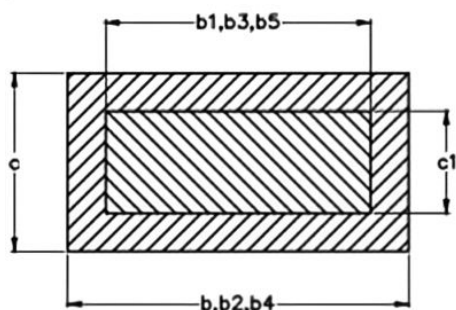
Fig. 14 Typical diode forward voltage as a function of junction temperature

Package Outline

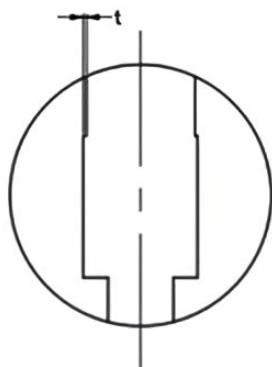
TO-247-3L



VIEW A-A



SECTION C-C, D-D, E-E



DETAIL: "A"

SYMBOLS	DIMENSIONS			
	mm		inch	
	MIN.	MAX.	MIN.	MAX.
A	4.90	5.10	0.193	0.201
A1	2.31	2.51	0.091	0.099
A2	1.90	2.10	0.075	0.083
b	1.16	1.26	0.046	0.050
b1	1.15	1.22	0.045	0.048
b2	1.96	2.06	0.077	0.081
b3	1.95	2.02	0.077	0.080
b4	2.96	3.06	0.117	0.120
b5	2.95	3.02	0.116	0.119
c	0.59	0.66	0.023	0.026
c1	0.58	0.62	0.023	0.024
D	20.90	21.10	0.823	0.831
D1	16.25	16.85	0.640	0.663
D2	1.05	1.35	0.041	0.053
E	15.75	15.90	0.620	0.626
E1	13.26	—	0.552	—
E2	4.90	5.10	0.193	0.201
e	5.44BSC		0.214BSC	
L	19.80	20.10	0.780	0.791
L1	—	4.30	—	0.169
ØP	3.50	3.70	0.138	0.146
ØP1	—	7.40	—	0.291
S	6.05	6.25	0.238	0.246
t	0.00	0.15	0.000	0.006

***Important Usage Information and Disclaimer**

The specifications of Zhuhai Hypersemi Co., Ltd. products are not guarantees of product characteristics. They reflect typical performance expected in standard applications, which may vary with specific uses. Users must conduct prior testing for their applications and make necessary adjustments.

Users are responsible for the safety of applications utilizing our products and must implement adequate safety measures to prevent physical injury, fire, or other risks in case of product failure. It is the user's duty to ensure that application designs comply with all applicable laws and standards. Our products must not be used in any applications where a product failure could reasonably result in personal injury, unless specifically authorized in a signed document by Zhuhai Hypersemi Co., Ltd.

No representations or warranties are made regarding the accuracy or completeness of this information, including any claims of non-infringement of third-party intellectual property rights. Zhuhai Hypersemi Co., Ltd. assumes no liability for any applications or uses of its products and does not grant any licenses to its intellectual property rights or those of others. We also make no claims regarding non-infringement of third-party intellectual property rights that may arise from applications.

Due to technical requirements, our products may contain hazardous substances. For details, please contact your nearest sales office. This document replaces all previous information and may be updated. We reserve the right to make changes.