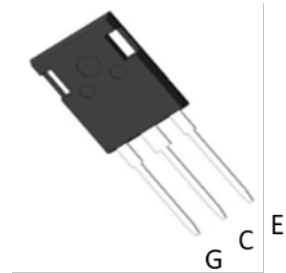


1200V 75A CoolFAST™ 7 Technology IGBT

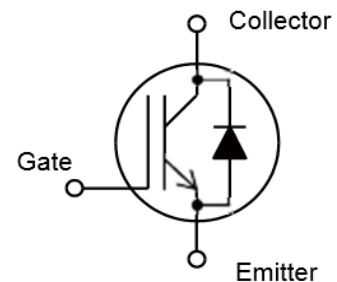
Features:

- Low switching power loss
- Low switching surge and noise
- Advanced Fieldstop technology
- Low EMI
- Maximum junction temperature 175°C
- Qualified according to JEDEC for target applications
- Pb-free lead plating, halogen-free mold compound, RoHS compliant



Applications:

- Industrial UPS
- Welding machine
- Solar converters
- Energy Storage
- Mid to high range switching frequency converters



Key Performance and Package Parameters

Type	V _{CE}	I _C	V _{CEsat} , T _{vj} =25°C	T _{vjmax}	Marking	Package
EX75N120EF7	1200V	75A	1.9V	175°C	75N120EF7	TO247PLUS-3L

Maximum Ratings and Characteristics

Absolute Maximum Ratings at T_{vj}= 25°C (unless otherwise specified)

Items	Symbols	Value	Units
Collector-Emitter voltage	V _{CEs}	1200	V
Gate-Emitter voltage	V _{GES}	±20	V
DC Collector Current, limited by T _{vjmax} T _c = 25°C T _c = 100°C	I _C	150 75	A
Pulsed Collector Current, tp limited by T _{vjmax}	I _{CP}	300	A
Turn-Off Safe Operating Area V _{ce} ≤ 1200V, T _j ≤ 175°C, tp=1μs	-	300	A
Diode Forward Current, limited by T _{vjmax} T _c = 25°C T _c = 100°C	I _F	150 75	A
Turn-Off Safe Operating Area V _{ce} ≤ 1200V, T _j ≤ 175°C, tp=1μs	-	300	A
IGBT Max. Power Dissipation	P _{D_IGBT}	625	W
FWD Max. Power Dissipation	P _{D_FWD}	350	W
Operating Junction Temperature	T _{vj}	-40 ~ +175	°C
Storage Temperature	T _{stg}	-55 ~ +150	°C

Electrical characteristics at $T_{vj}=25^{\circ}\text{C}$ (unless otherwise specified)

Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
Collector-emitter breakdown voltage	$V_{(BR)CES}$	$V_{GE}=0V, I_C=0.50\text{mA}$	1200	-	-	V
Zero Gate Voltage Collector Current	I_{CES}	$V_{CE}=1200V, V_{GE}=0V$	-	-	200	μA
Gate-Emitter Leakage Current	I_{GES}	$V_{CE}=0V, V_{GE}=\pm 30V$	-	-	± 200	nA
Gate-Emitter Threshold Voltage	$V_{GE(th)}$	$V_{CE}=V_{GE}, I_C=2.6\text{mA}$	5.0	5.8	6.6	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	$V_{GE}=15V, I_C=75A$	-	1.9	2.2	V
		$T_{vj}=25^{\circ}\text{C}$	-	2.8	-	V
Input Capacitance	C_{ies}	$V_{CE}=25V, V_{GE}=0V$ $f=1\text{MHz}$	-	19.5	-	nF
Output Capacitance	C_{oes}		-	240	-	pF
Reverse Transfer Capacitance	C_{res}		-	130	-	pF
Gate Charge	Q_G	$V_{CC}=960V, I_C=75A, V_{GE}=15V$	-	590	-	nC
Forward Voltage Drop	V_F	$I_F=75A$	-	2.2	3.0	V
		$T_{vj}=175^{\circ}\text{C}$	-	1.8	-	V

Switching Characteristics at $T_{vj}=25^{\circ}\text{C}$

Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
IGBT Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}= 600V$ $I_C= 75A$ $V_{GE}= 15V$ $R_G= 0.6\Omega$	-	42	-	ns
Rise Time	t_r		-	146	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	122	-	ns
Fall Time	t_f		-	105	-	ns
Turn-On Energy	E_{on}		-	4.0	-	mJ
Turn-Off Energy	E_{off}		-	2.4	-	mJ
Total switching energy	E_{ts}		-	6.4	-	mJ
Diode Characteristics						
Diode Reverse Recovery Time	t_{rr}	$V_{CC}= 600V$	-	210	-	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_F= 75A$	-	2.9	-	μC
Diode peak reverse recovery current	I_{rrm}	$di_f/dt= 680A/\mu s$	-	26	-	A

Switching Characteristics at $T_{vj}=150^{\circ}\text{C}$

Description	Symbols	Conditions	Characteristics			Unit
			Min	Typ	Max	
IGBT Characteristics						
Turn-On Delay Time	$t_{d(on)}$	$V_{CC}= 600V$ $I_C= 75A$ $V_{GE}= 15V$ $R_G= 0.6\Omega$	-	41	-	ns
Rise Time	t_r		-	138	-	ns
Turn-Off Delay Time	$t_{d(off)}$		-	142	-	ns
Fall Time	t_f		-	132	-	ns
Turn-On Energy	E_{on}		-	3.6	-	mJ
Turn-Off Energy	E_{off}		-	3.4	-	mJ
Total switching energy	E_{ts}		-	7.0	-	mJ
Diode Characteristics						
Diode Reverse Recovery Time	t_{rr}	$V_{CC}= 600V$	-	330	-	ns
Diode Reverse Recovery Charge	Q_{rr}	$I_F= 75A$	-	10.5	-	μC
Diode peak reverse recovery current	I_{rrm}	$di_F/dt= 680A/\mu s$	-	64	-	A

Thermal resistance

Items	Symbols	Characteristics			Unit
		Min	Typ	Max	
Thermal Resistance, Junction-Ambient	$R_{th(j-a)}$	-	-	50	°C /W
Thermal Resistance, IGBT Junction to Case	$R_{th(j-c)}$	-	-	0.24	
Thermal Resistance, Diodes Junction to Case	$R_{th(j-c)}$	-	-	0.43	

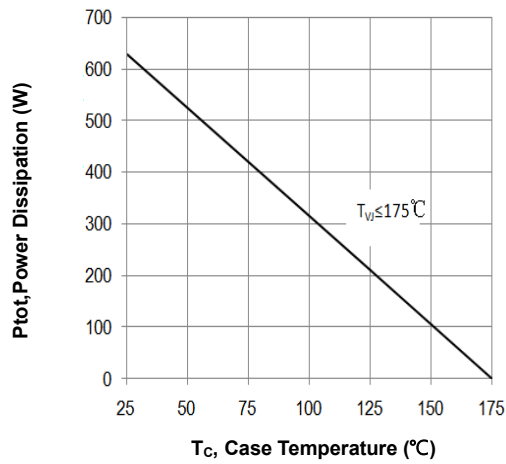


Figure 1. Power dissipation vs. case temperature
($T_{vj} \leq 175^\circ\text{C}$)

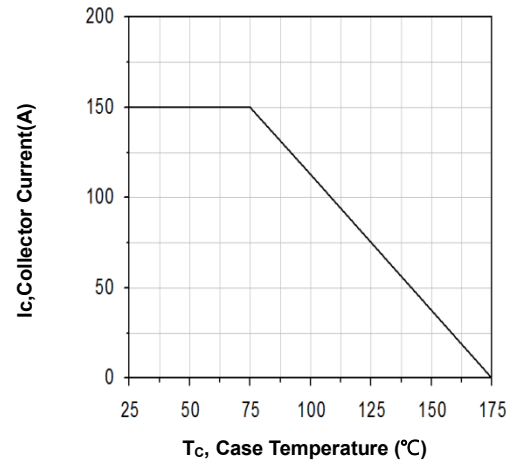


Figure 2. DC Collector current vs. Case temperature
($V_{GE} \leq 15\text{V}$, $T_{vj} \leq 175^\circ\text{C}$)

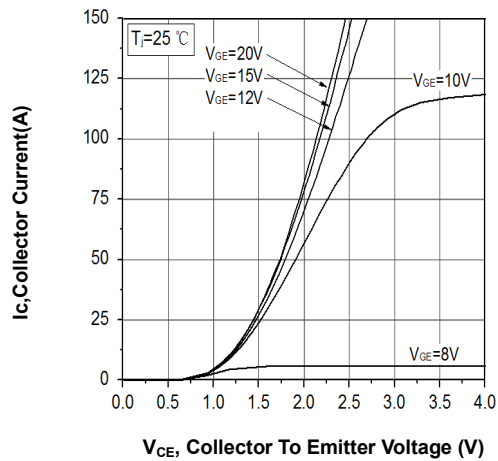


Figure 3. Typical output characteristic
($T_{vj} = 25^\circ\text{C}$)

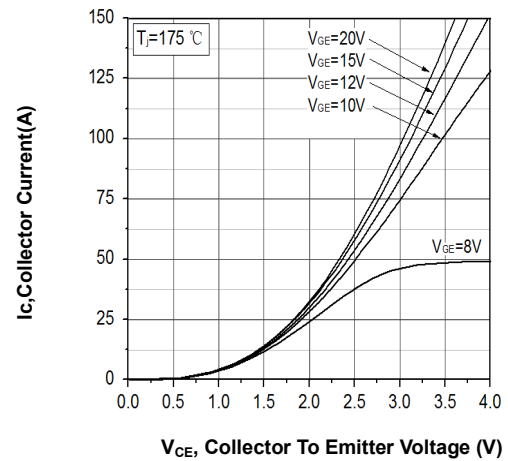


Figure 4. Typical output characteristic
($T_{vj} = 175^\circ\text{C}$)

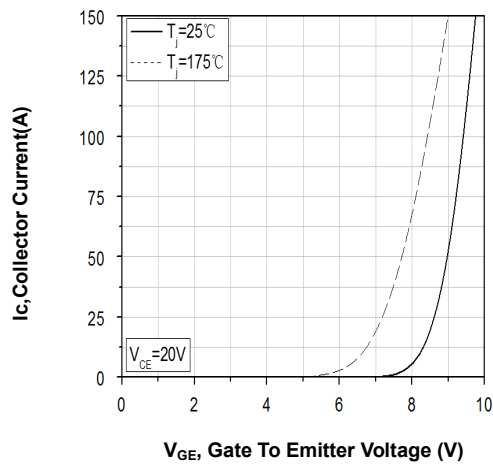


Figure 5. Typical transfer characteristic
($V_{CE} = 20\text{V}$)

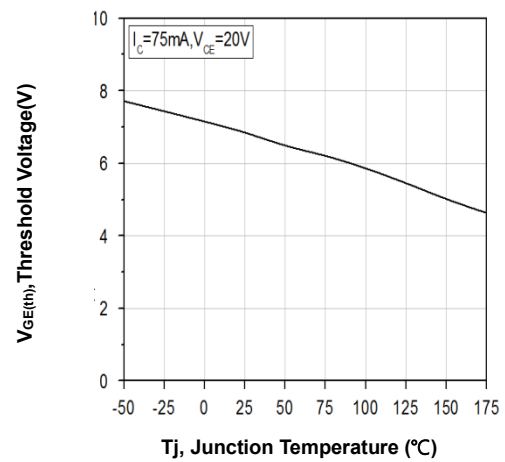


Figure 6. Gate threshold voltage
($I_C = 75\text{mA}$, $V_{CE} = 20\text{V}$)

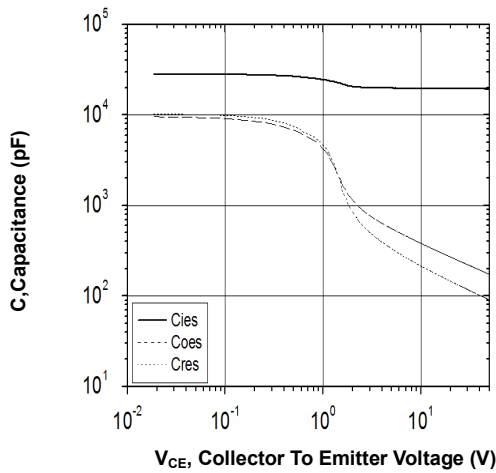


Figure 7. Typical capacitance vs. collector-emitter voltage ($V_{GE}=0V$, $f=1MHz$)

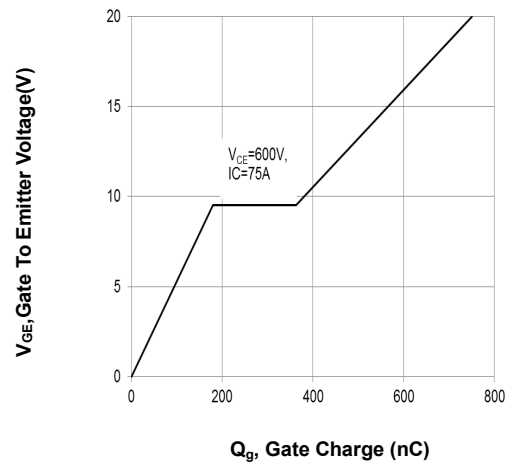


Figure 8. Typical gate charge ($I_C=75A$, $V_{CE}=600V$, $T_{vj} = 25^{\circ}C$)

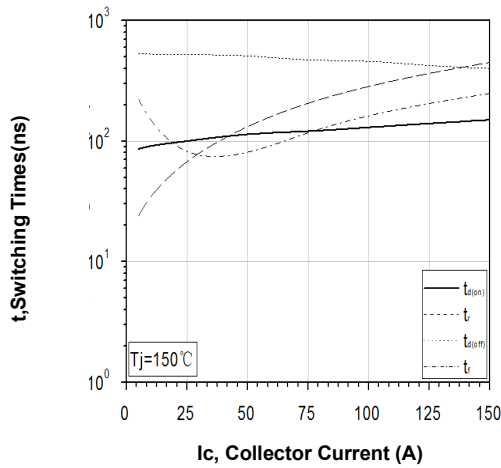


Figure 9. Typical switching times vs. collector current ($T_{vj}=150^{\circ}C$, $V_{CE}=600V$, $V_{GE}=15V$, $R_g=10\Omega$)

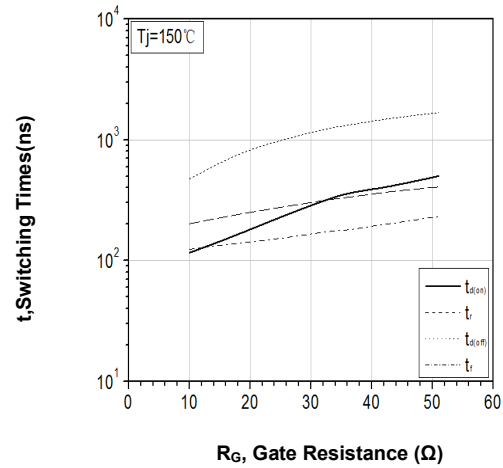


Figure 10. Typical switching times vs. gate resistor ($T_{vj}=150^{\circ}C$, $V_{CE}=600V$, $V_{GE}=15V$, $I_C=75A$)

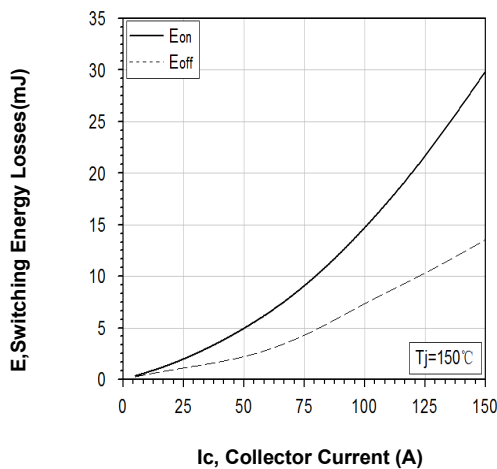


Figure 11. Typical switching losses vs. Collector current ($T_{vj}=150^{\circ}C$, $V_{CE}=600V$, $V_{GE}=15V$, $R_g=10\Omega$)

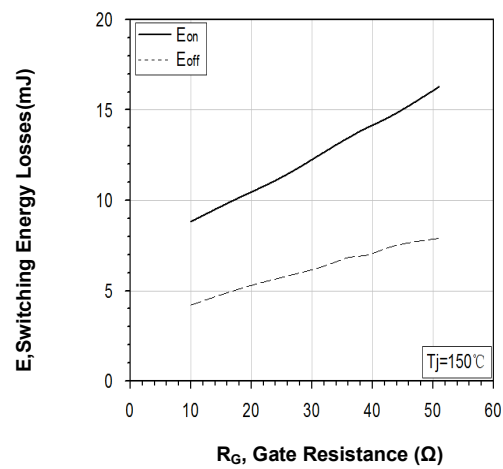


Figure 12. Typical capacitance vs. collector-emitter voltage ($T_{vj}=150^{\circ}C$, $V_{CE}=600V$, $V_{GE}=15V$, $R_g=10\Omega$)

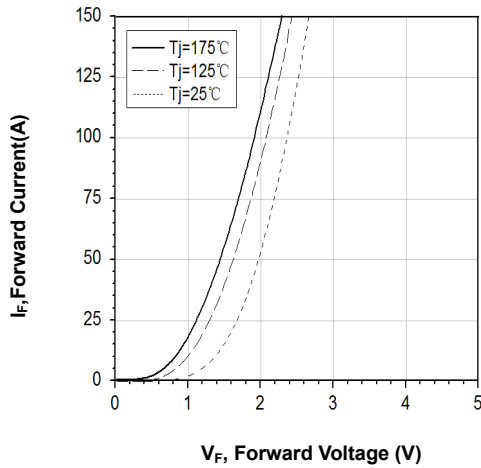


Figure 13. Typical forward characteristics of diode
(V_{CE}=600V, V_{GE}=15V, R_g=10Ω)

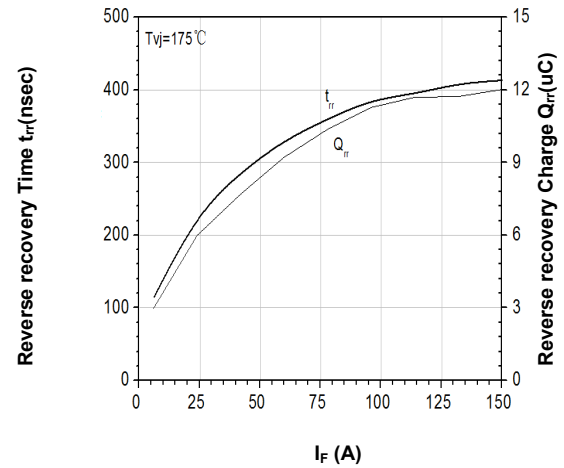


Figure 14. Typical reverse recovery characteristics vs. forward current of diode
(T_{vj}=175°C, V_{CE}=600V, V_{GE}=15V, R_g=10Ω)

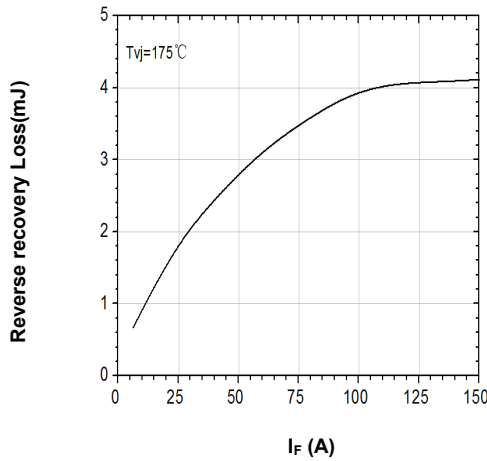


Figure 15. Typical reverse recovery loss vs. forward current of diode
(T_{vj}=175°C, V_{CE}=600V, V_{GE}=15V, R_g=10Ω)

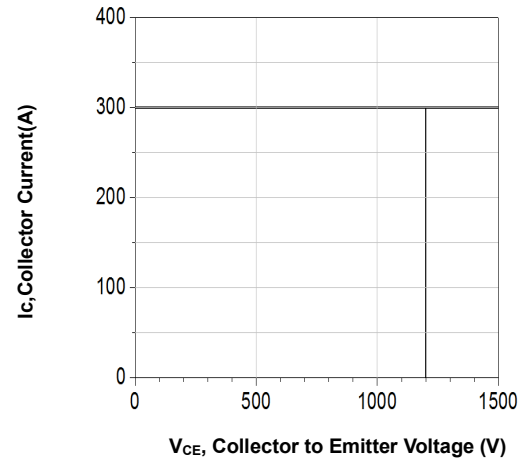


Figure 16. Reverse biased safe operating area
(T_{vj}=175°C, V_{GE}=15/0V, R_g=20Ω)

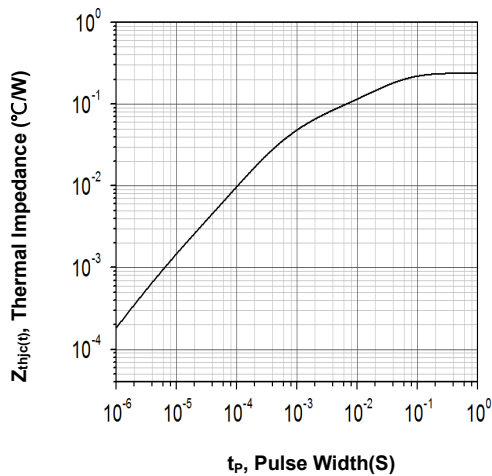


Figure 17. Transient thermal impedance of IGBT
(D=0)

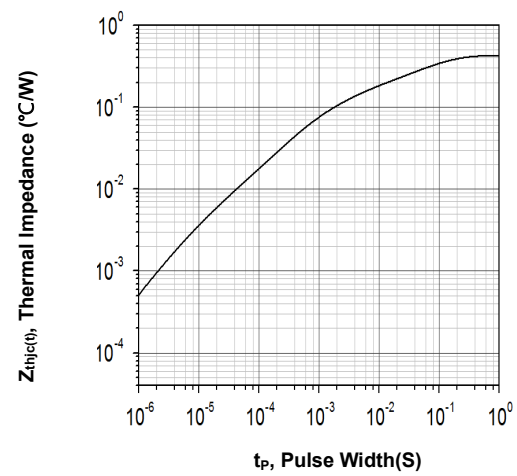
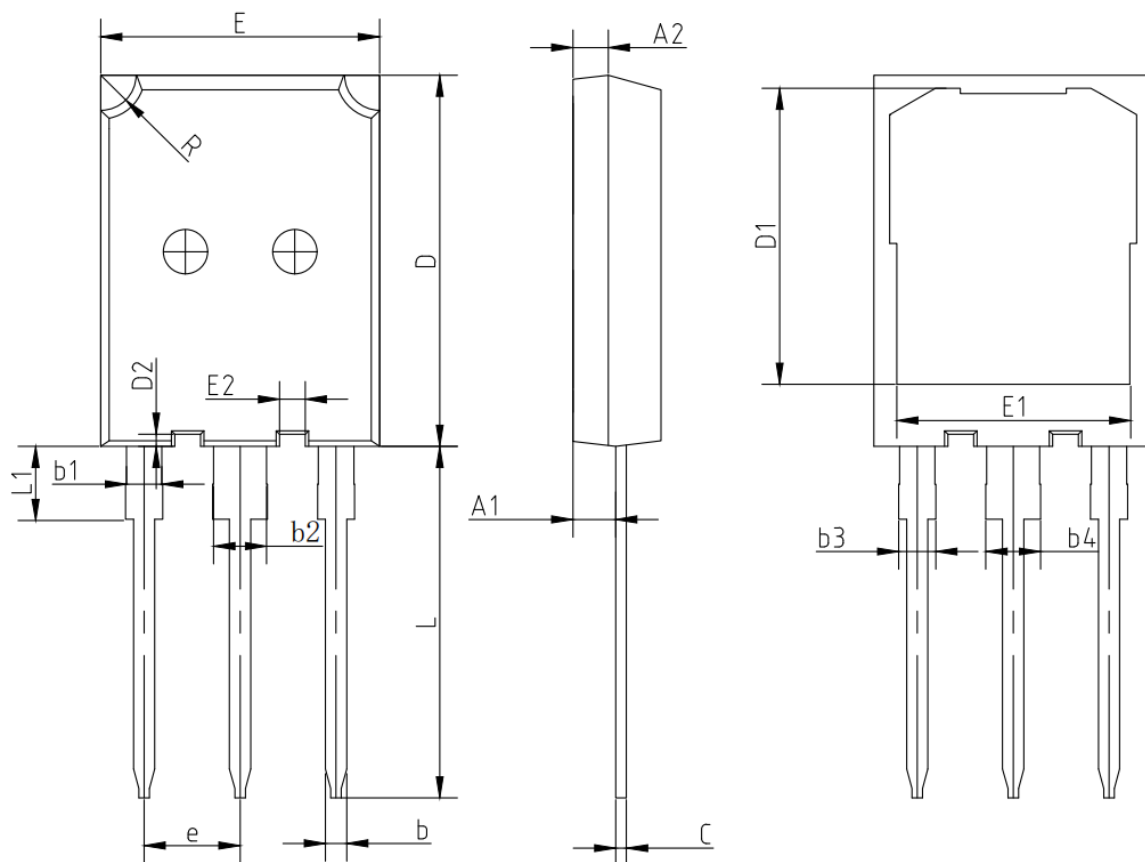


Figure 18. Transient thermal impedance of diode
(D=0)

TO247Plus-3L Package Outline



T0247-3L			
DIM.	MIN.	NOM.	MAX.
A	4.90	5.00	5.10
A1	2.31	2.432	2.51
A2	1.90	2.00	2.10
b	1.16	1.20	1.26
b1	1.96	2.00	2.06
b2	2.96	3.00	3.06
b3	-	-	2.25
b4	-	-	3.25
c	0.59	0.60	0.66
D	20.90	21.00	21.10
D1	16.25	16.55	16.85
D2	0.58	0.68	0.78
E	15.70	15.80	15.90
E1	13.10	13.20	13.50
E2	1.30	1.45	1.60
e	5.436BSC		
L	19.80	19.90	20.10
L1	-	-	4.30
R	1.85	2.00	2.15
All dimensions in millimeters			

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