CMT-PLA0BN06075LA DATASHEET

650V/75A IGBT in TGFS Technology (Low Switching Losses)

Version: 1.3
3-Oct-25
(Last Modification Date)

General description

CMT-PLA0BN06075LA is a 650V/75A IGBT with low switching losses in Trench Gate Field Stop (TGFS) technology. The product offers fast switching, high pulsed current capability and short tail currents. It also features a free wheeling diode with fast and soft reverse recovery. It is available in a TO-247-3L package, and is guaranteed for normal operation over the full temperature range from -40°C to +175°C (Tj).

Benefits

- Trench Gate Field Stop Technology
- Low switching losses
- VCE(sat) with positive temperature coefficient
- Fast switching and short tail current
- High pulsed current capability
- Free wheeling diodes with fast and soft reverse recovery

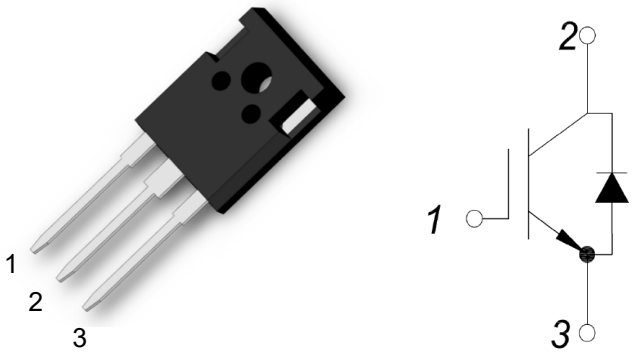
Features

- Specified from -40 to +175°C (Tj)
- V_{CE} Max: 650V
- I_C Max Collector Current
  - 100A at T_C=25°C
  - 75A at T_C=100°C
- $I_{C(pulse)}$ = 300A
- Typical Saturation Voltage
  - $V_{CE(sat)}$= 1.65V @ I_C=75A, Tj=25°C
  - $V_{CE(sat)}$= 1.95V @ I_C=75A, Tj=125°C
- Low Switching Energy
  - Eon= 2.5mJ at Tj=125°C
  - Eoff= 1.15mJ Tj=125°C
- Low gate charge: Q_G=170nC
- Package: TO-247-3L

Applications

- Motor control
- UPS/PFC
- General purpose inverters

Package Configuration



TO-247-3L (Pin 1= Gate; Pin 2= Collector; Pin 3= Emitter)

Absolute Maximum Ratings

Parameter	Sym-bol	Condition	Value	Unit
Collector Emitter Voltage	V_{CES}	T_j=25°C	650	V
Gate Emitter Voltage	V_{GES}		+/-20	V
		Transient (Tp ≤10µs, D < 0.01)	+/-30	V
DC Collector Current	I_C	T_C=25°C	100	A
		T_C=100°C	75	A
Pulsed Collector Current	I_{Cpulse}	Tp limited by Tjmax	300	A
Power Dissipation per IGBT	P_{TOT}		385	W
Repetitive Reverse Voltage	V_{RSM}	T_j=25°C	650	V
Forward Current	I_F	T_C=25°C	100	A
		T_C=100°C	75	A
Diode Pulsed Current	I_{Fpulse}	Tp limited by Tjmax	300	A
Maximum Junction Temperature	T_{jmax}		175	°C
Operating Temperature	T_{jop}		-40 to 175	°C
Storage Temperature	T_{stg}		-55 to 150	°C
Wave Soldering Temperature	T_{SLD}	1.6mm from case for 10s	260	°C
Maximum Mounting Torque	M	M3 srew	1.1	Nm
Weight	m		8	g

THERMAL RESISTANCE (T_C=25°C unless otherwise specified)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Junction-to-case thermal resistance	R_{thJC}	IGBT			0.39	°C/W
Junction-to-case thermal resistance	R_{thJCD}	Diode			0.36	
Junction-to-ambient thermal resistance	R_{thJA}				40	

IGBT Electrical characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Gate Emitter Threshold Voltage	$V_{GE(TH)}$	V_{CE} =V_{GE}, I_C=3.0mA		3.6	4.1	4.7	V
Collector Emitter Saturation Voltage	$V_{CE(Sat)}$	I_C =75A, V_{GE}=15V, T_j=25°C			1.65		V
		I_C =75A, V_{GE}=15V, T_j=125°C			1.95		
		I_C =75A, V_{GE}=15V, T_j=150°C			2.05		
Collector Leakage Current	I_{CES}	V_{CE} =650V, V_{GE}=0V, T_j=25°C				100	µA
		V_{CE} =650V, V_{GE}=0V, T_j=150°C				5	mA
Gate Leakage Current	I_{GES}	V_{CE} =0V, V_{GE}=+/-20V, T_j=25°C		-200		200	nA
Transconductance	g_{fs}	V_{CE} =20V, I_C=75A, T_j=25°C			70		S
Gate Charge	Q_G	V_{GE} =400V, I_C=75A, V_{CE} =15V			170		nC
Input Capacitance	C_{IES}	V_{CE} =25V, V_{GE} =0V, f = 1 MHz			5400		pF
Output Capacitance	C_{OES}				330		
Reverse Transfer Capacitance	C_{RES}				40		
Turn-on delay time	$T_{d(ON)}$	V_{CC}=400V; V_{GE}= 15V; I_C = 75A; R_G= 7.5Ω; Inductive load	T_j=25°C		30		ns
			T_j=125°C		26		
			T_j=150°C		26		
Rise time	T_r		T_j=25°C		20		
			T_j=125°C		24		
			T_j=150°C		26		
Turn-off delay time	$T_{d(OFF)}$		T_j=25°C		135		
			T_j=125°C		150		
			T_j=150°C		150		
Fall time	T_f		T_j=25°C		38		
			T_j=125°C		56		
			T_j=150°C		56		
Turn-On Switching Energy	E_{on}		T_j=125°C		2.5		mJ
			T_j=150°C		2.7		
Turn-Off Switching Energy	E_{off}		T_j=125°C		1.15		
			T_j=150°C		1.2		

Anti-Parallel Diode Characteristics

Unless otherwise stated, T_j =25°C.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=75A; V_{GE}=0V; T_j=25°C;		1.4	1.85	V
		I_F=75A; V_{GE}=0V; T_j=125°C;		1.33		
		I_F=75A; V_{GE}=0V; T_j=150°C;		1.28		
Reverse Recovery Time	T_{rr}	I_F=75A; V_R=400V; dI_F/dt = -1950A/µS; T_j=150°C;		240		ns
Peak Reverse Recovery Current	I_{RRM}			69		A
Reverse Recovery Charge	Q_{RR}			10		µC
Reverse Recovery Energy	E_{rec}			2.78		mJ

Typical Performance Characteristics

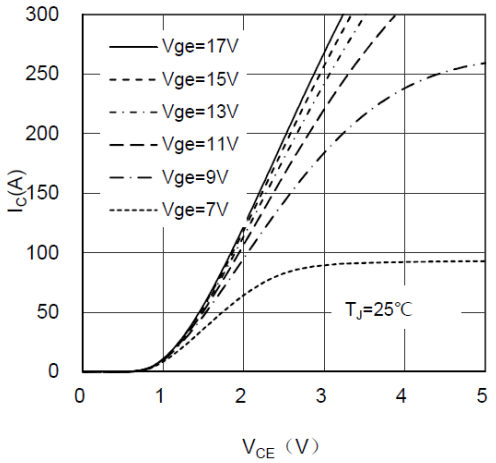


Figure 1: Typical Output Characteristics

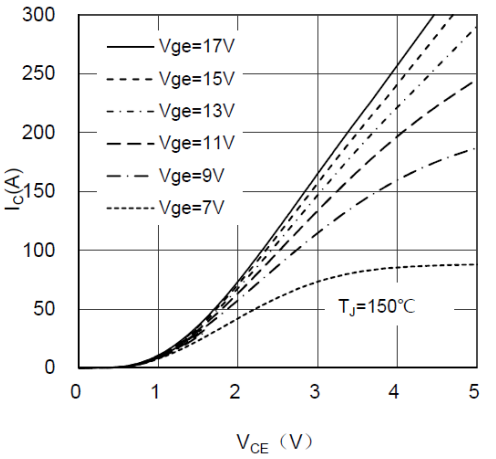


Figure 2: Typical Output Characteristics

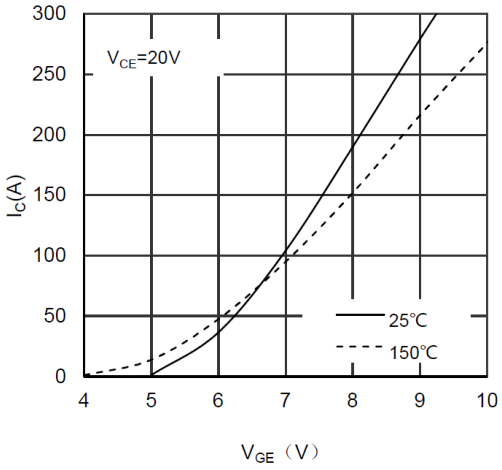


Figure 3: Typical Transfer characteristics

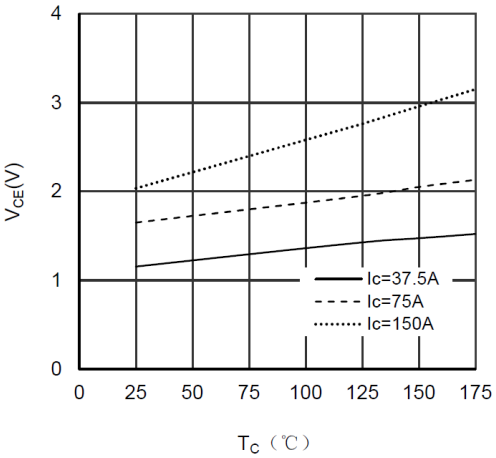


Figure 4: Collector-Emitter Voltage vs T_C

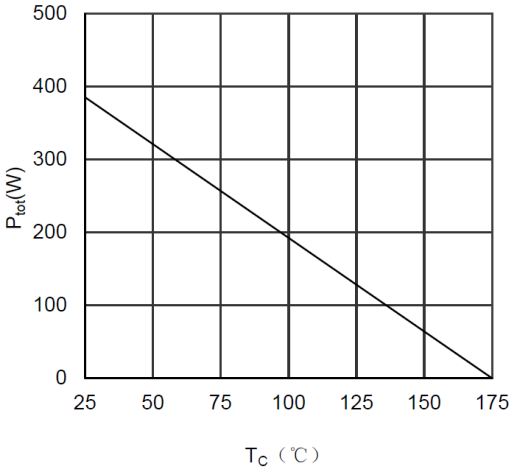


Figure 5: Power Dissipation vs T_C

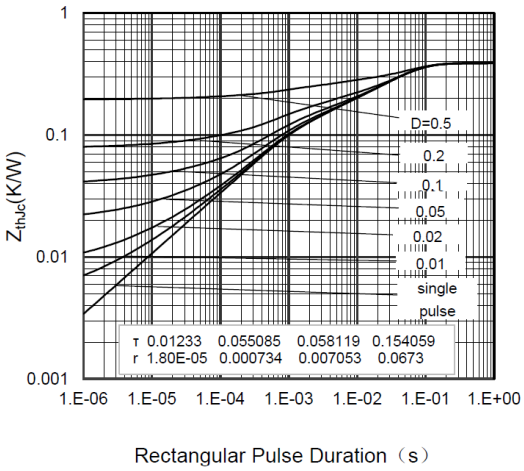


Figure 6: IGBT Transient Thermal Impedance

Typical Performance Characteristics (cnt'd)

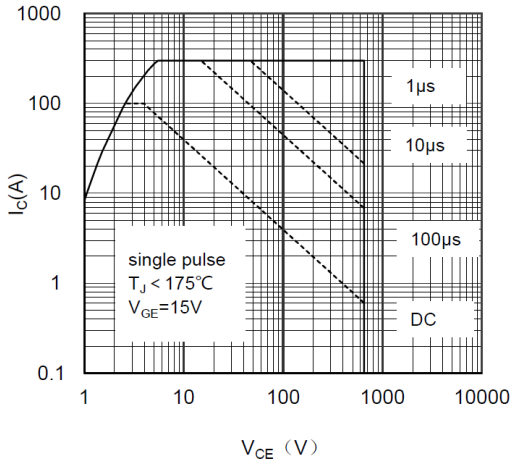


Figure 7: Forward Biased Safe Operating Area

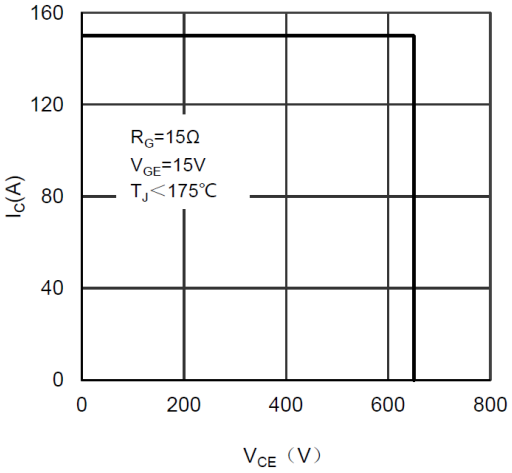


Figure 8: Reverse Biased Safe Operating Area

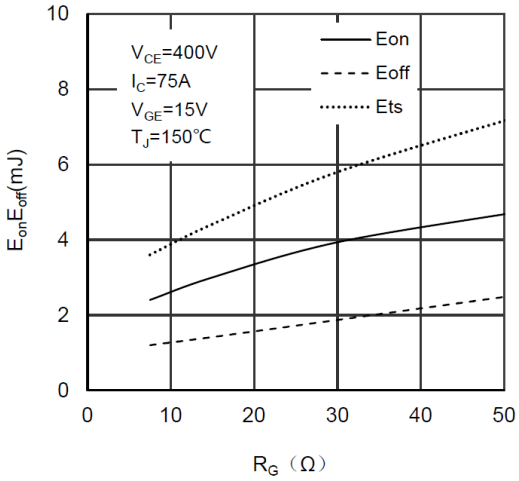


Figure 9: Switching Energy vs Gate Resistor

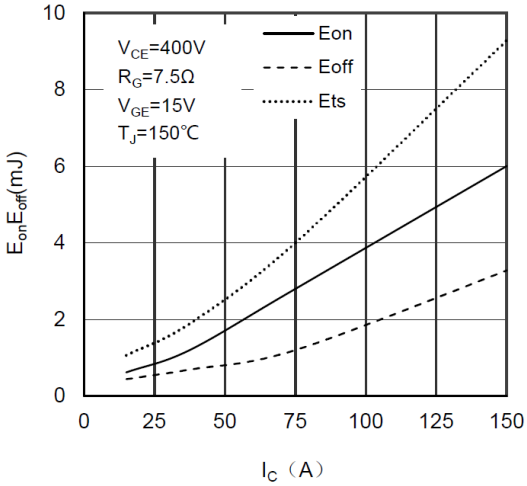


Figure 10: Switching Energy vs Collector Current

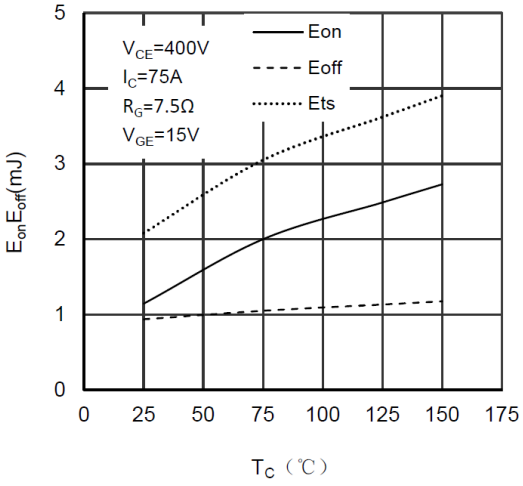


Figure 11: Switching Energy vs T_C

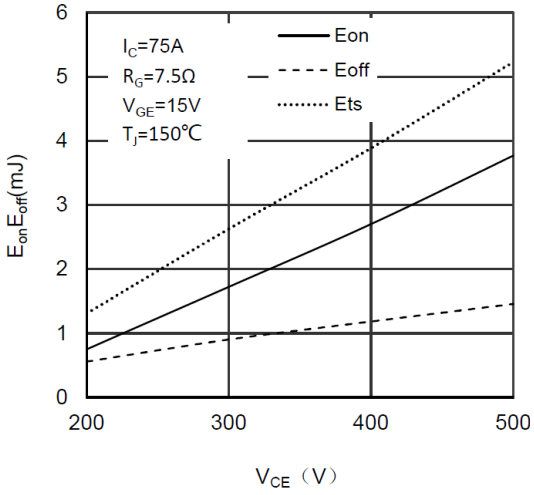


Figure 12: Switching Energy vs Collector-Emitter Voltage

Typical Performance Characteristics (cnt'd)

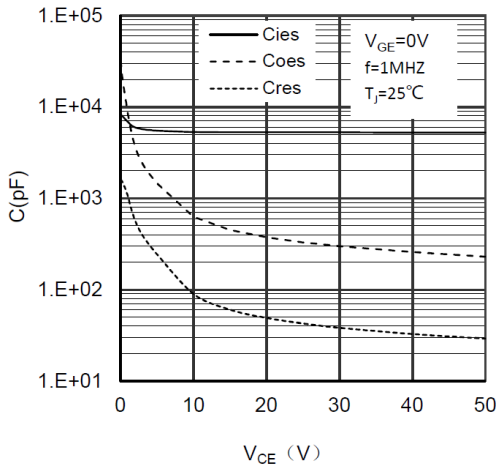


Figure 13: Typical capacitances

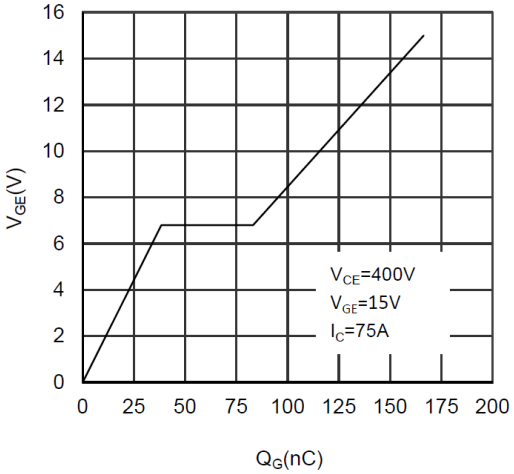


Figure 14: Typical Gate Charge

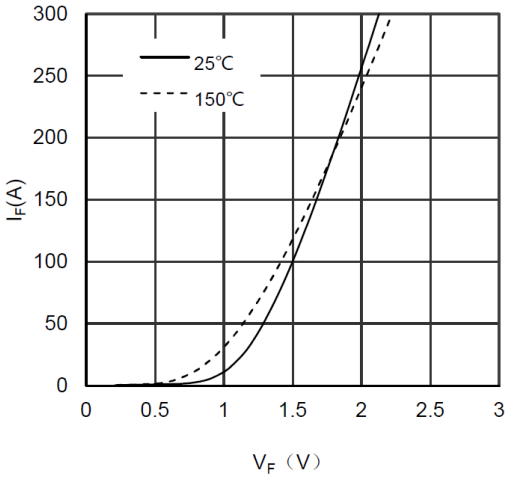


Figure 15: Diode Forward Characteristics

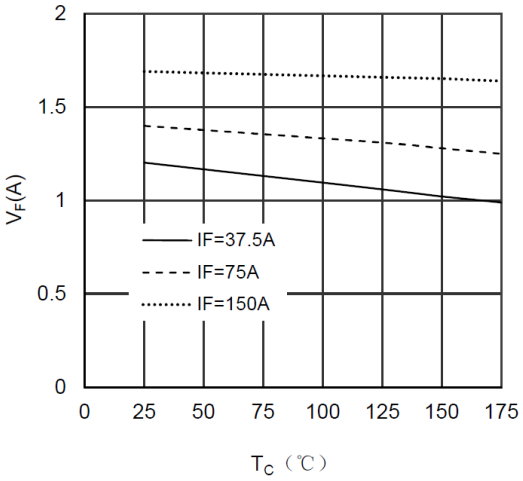


Figure 16: Forward Voltage vs T_C

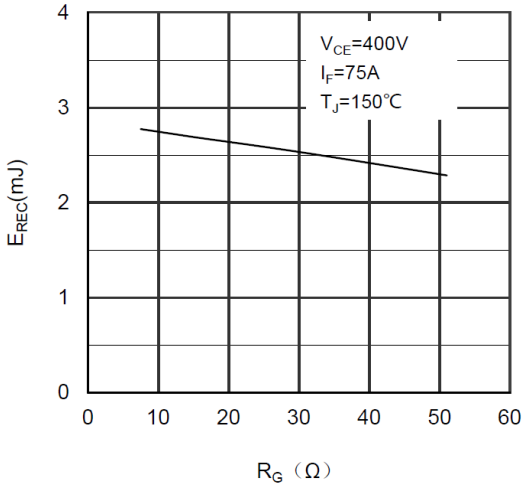


Figure 17: Reverse Recovery Energy vs Gate Resistor

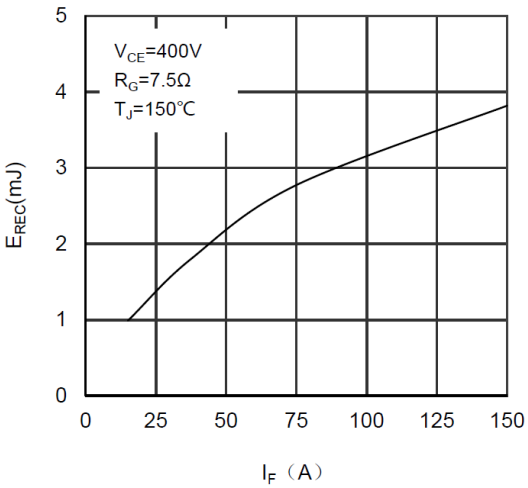


Figure 18: Reverse Recovery Energy vs Diode Forward Current

Typical Performance Characteristics (cnt'd)

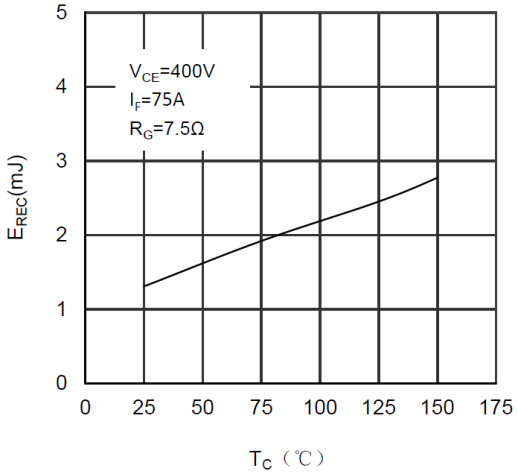


Figure 19: Reverse Recovery Energy vs Case temperature Diode

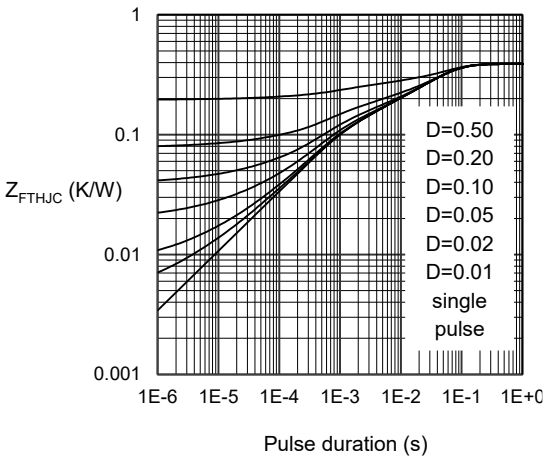
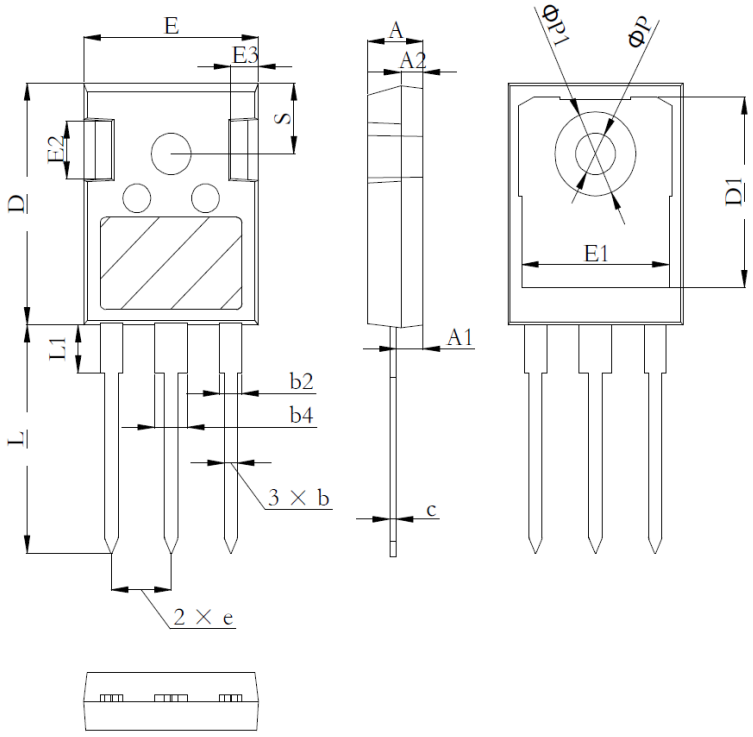


Figure 20: Diode Transient Thermal Impedance

Package Dimensions



Symbol	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	1.10	1.23	1.36
b2	1.90	2.05	2.20
b4	2.90	3.05	3.20
c	0.50	0.60	0.75
e		5.44BSC	
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
D	20.70	21.00	21.30
D1	16.25	16.55	16.85
L	19.60	19.91	20.22
L1	-	-	4.30
ΦP	3.40	3.60	3.80
ΦP1	-	-	7.30
S		6.15BSC	

Dimensions in (mm)