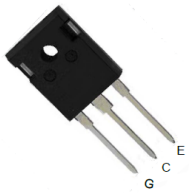
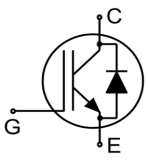
650V/60A Trench FS II Fast IGBT

Features

- Trench FS II Technology
- Very low VCE(sat)
- High speed switching
- ROHS Compliant

Pin Description

TO-247	Symbol
	

Applications

- Inverter welding machine
- Motor drives
- UPS

V_{CES}	650	V
$V_{CE(sat)-Typ}$	1.7	V
I_C	75	A

Absolute Maximum Ratings(T_C=25℃, Unless Otherwise Noted)

Parameter		Symbol	Rating	Units
Collector-Emitter Voltage		V_{CES}	650	V
Gate- Emitter Voltage		V_{GES}	±25	V
Collector Current[1]	T_C=25℃	I_C	150	A
Collector Current[1]	T_C=100℃	I_C	75	A
Pulsed Collector Current[2]		I_{CM}	225	A
Diode Continuous Forward Current	T_C=100℃	I_F	75	A
Diode Pulsed Forward Current		I_{FM}	225	A
Power Dissipation	T_C=25℃	P_D	416	W
Power Dissipation	T_C=100℃	P_D	208	W
Storage Temperature Range		T_{STG}	-55 to 175	℃
Operating Junction Temperature Range		T_J	-55 to 175	℃

Thermal Characteristics

Parameter	Symbol	Typ	Max	Unit
Thermal Resistance Junction-Ambient	$R_{\theta JA}$	---	40	℃/W
Thermal Resistance Junction to case for IGBT	$R_{\theta JC}$	---	0.36	℃/W
Thermal Resistance Junction to case for Diode	$R_{\theta JCD}$	---	0.41	℃/W

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Electrical Characteristics (T_J=25℃, Unless Otherwise Noted)

Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Collector-Emitter Breakdown Voltage	BV_{CES}	V_{GE}=0V , I_C=250uA		650	---	---	V
Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE}=15V, I_C=75A,	Tj=25°C	---	1.7		V
			Tj=175°C	---	2.2	---	V
Gate Threshold Voltage	$V_{GE(th)}$	V_{CE}=V_{GE} , I_C =1mA		5.5	6.0	6.5	V
Collector-Emitter Leakage Current	I_{CES}	V_{CE}=650V, V_{GE}=0V		---	---	1	uA
Gate to Emitter Leakage Current	I_{GES}	V_{GE}=± V, V_{CE}=0V		---	---	± 00	nA
Total Gate Charge	Q_g	V_{CE}=400V , V_{GE}=15V , I_C=75A		---	285	---	nC
Gate to Emitter Charge	Q_{ge}			---	58	---	nC
Gate to Collector Charge	Q_{gc}			---	96	---	nC
Turn-On Delay Time	$t_{d(ON)}$	V_{CE}=400V,I_C=75A, V_{GE}=15V, R_g=10Ω, Inductive Load		---	60	---	ns
Rise Time	t_r			---	160	---	
Turn-Off Delay Time	$t_{d(off)}$			---	274	---	
Fall Time	t_f			---	134	---	
Turn-On Switching Loss	E_{on}			---	3.85	---	mJ
Turn-Off Switching Loss	E_{off}			---	0.9	---	
Total Switching Loss	E_{ts}			---	2.0	---	
Input Capacitance	C_{ies}	V_{CE}=25V , V_{GE}=0V , f=1MHz		---	7020	---	pF
Output Capacitance	C_{oes}			---	198	---	
Reverse Transfer Capacitance	C_{res}			---	130	---	

Drain-Source Diode Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Diode Forward Voltage	V_F	I_F=60A,T_C=25℃	---	1.7	2.4	V
Reverse Recovery Time	trr	I_F=60A , di/dt=200Aμs， T_C=25℃	---	186	---	nS
Reverse Recovery Charge	Qrr		---	0.3	---	uC
Diode Peak Reverse Recovery Current	I_{rrm}		---	3.8	---	A

Note:

1.The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%

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Typical Characteristics

Figure 1 Output Characteristics

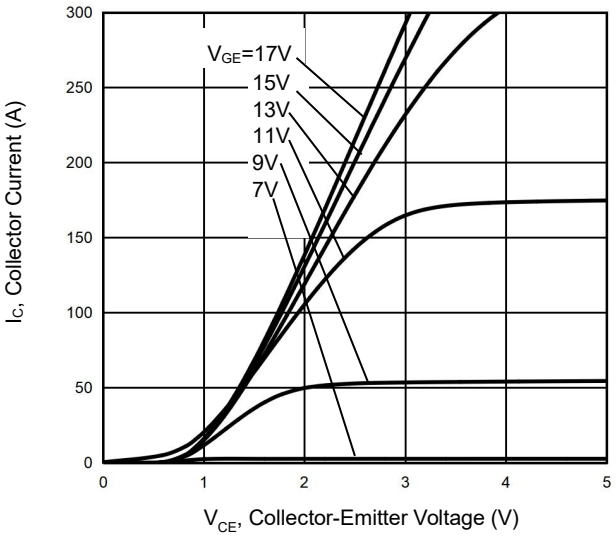


Figure 2 Transfer Characteristics

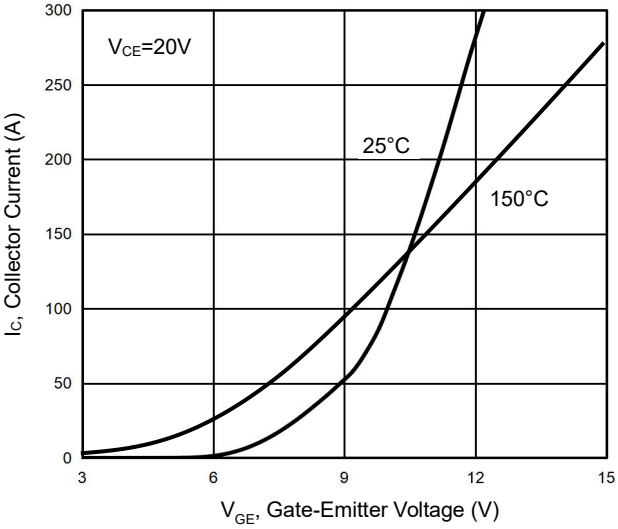


Figure 3 V_{CEsat} vs. Case Temperature

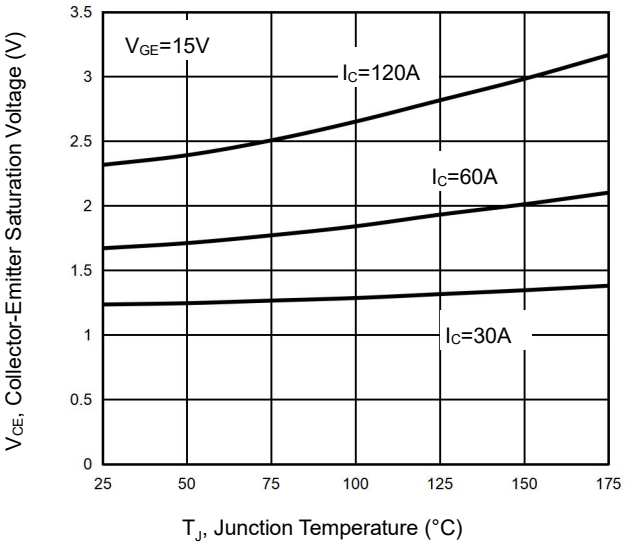


Figure 4 Saturation Voltage vs. V_{GE}

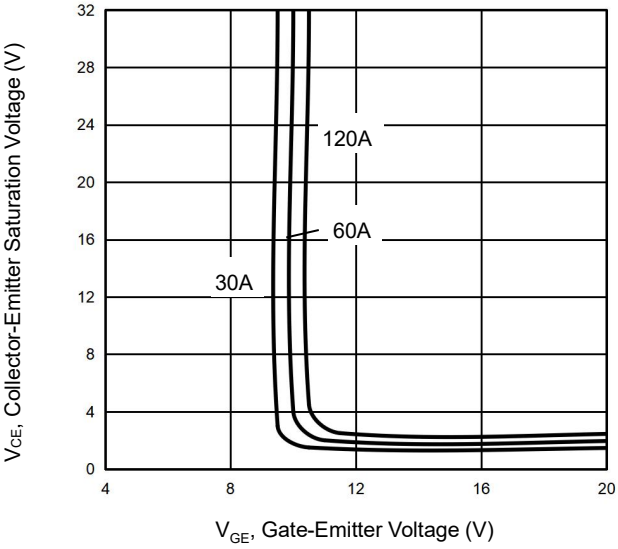


Figure 5 Capacitance Characteristics

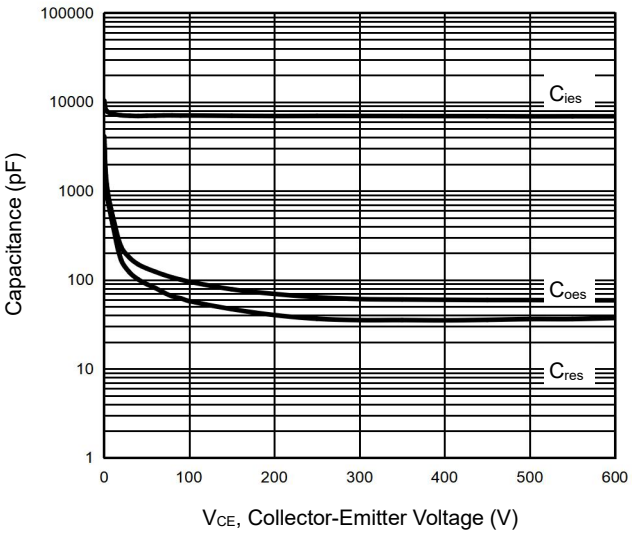


Figure 6 Gate Charge Wave Form

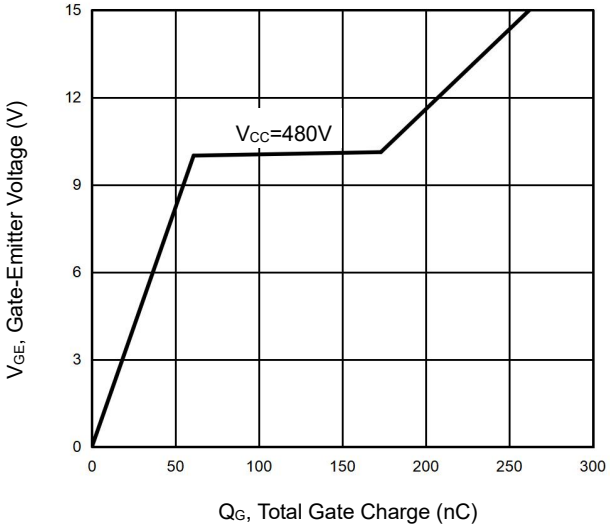


Figure 7 Forward Characteristics

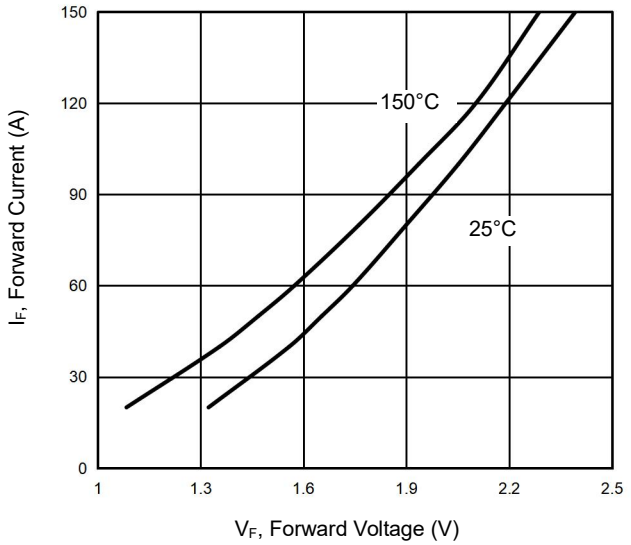


Figure 8 V_F vs. Temperature

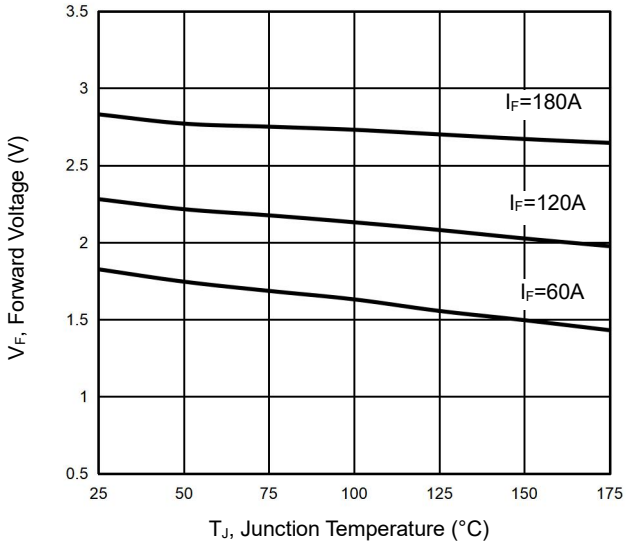


Figure 9 Switching Loss vs. R_G

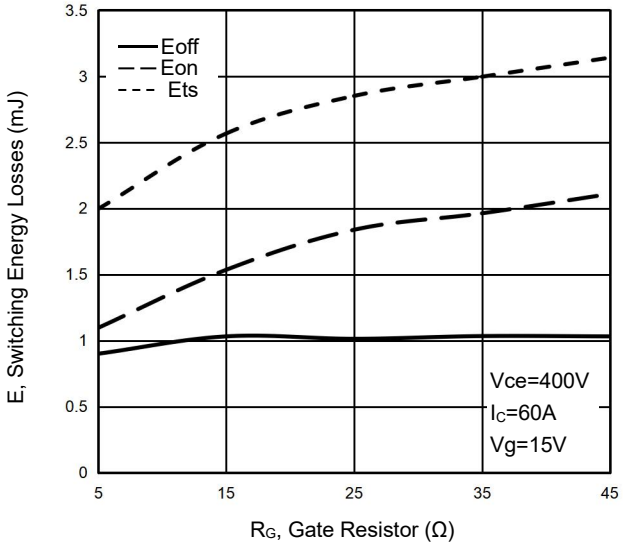


Figure 10 Switching Energy vs. Temperature

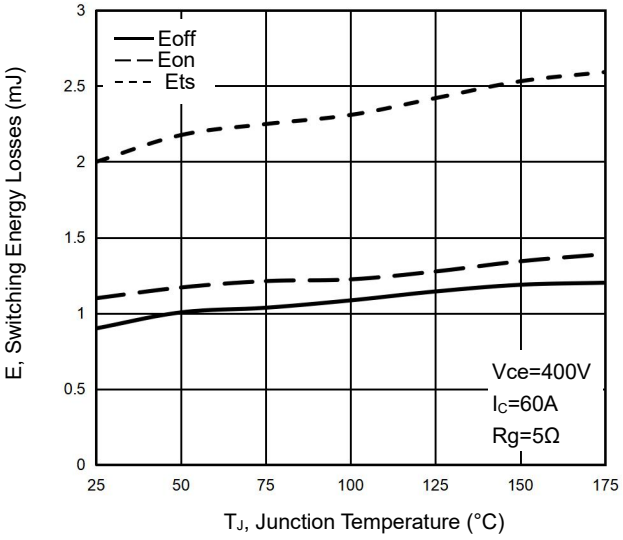


Figure 11 Switching Loss vs. Collector Current

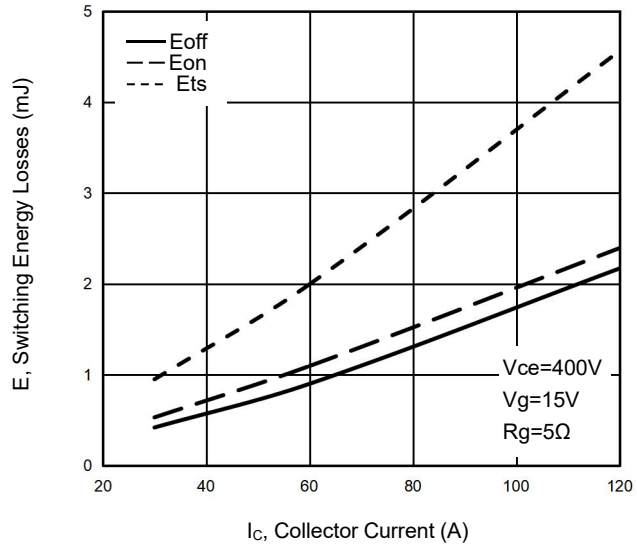


Figure 12 $V_{CE(sat)}$ vs. Collector Current

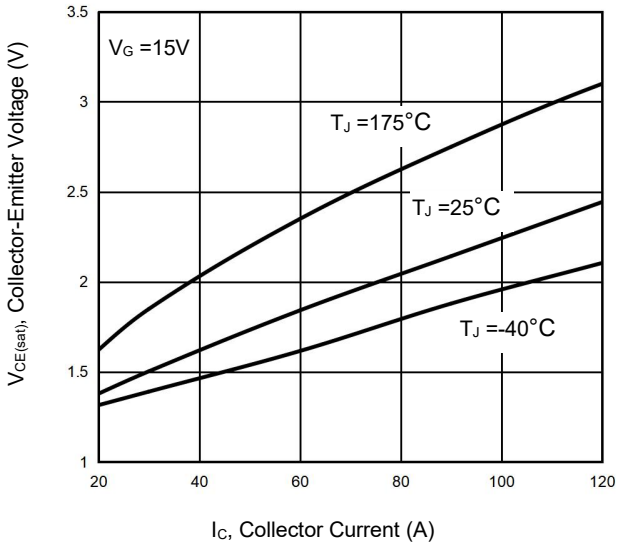


Figure 13 $V_{GE(th)}$ vs. Junction Temperature

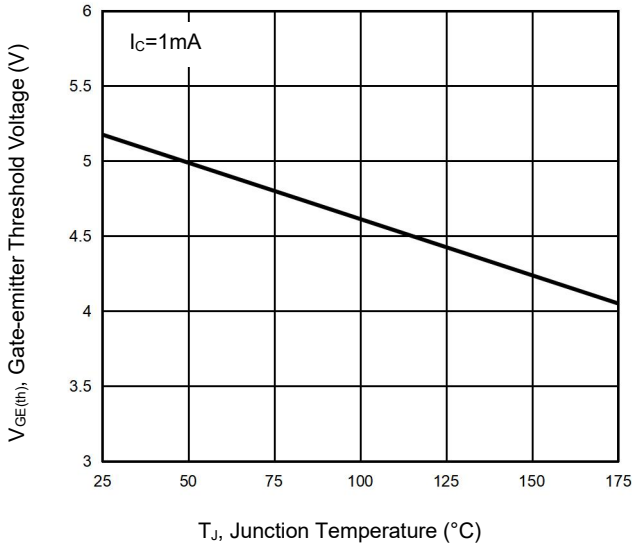


Figure 14 $V_{CE(SAT)}$ vs. Collector Current

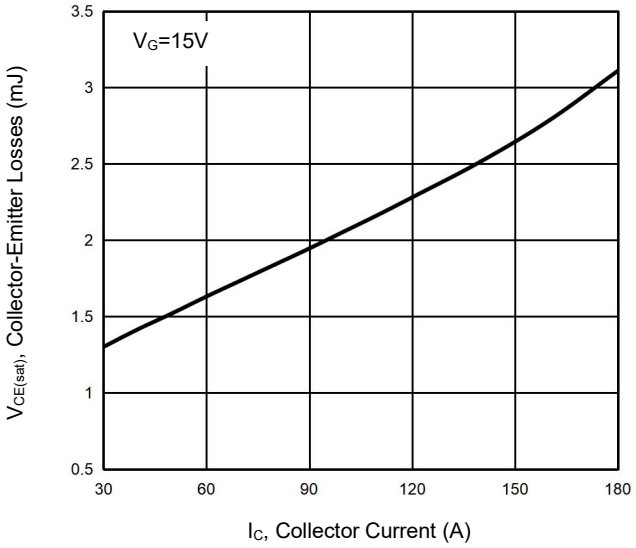


Figure 15 Forward Bias Safe Operating Area

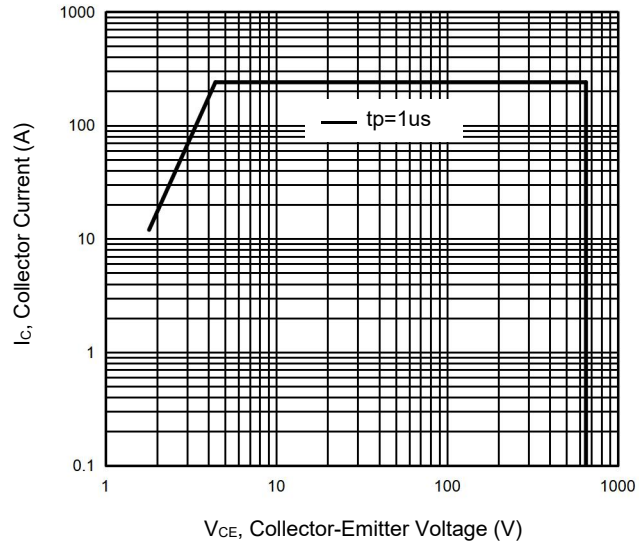
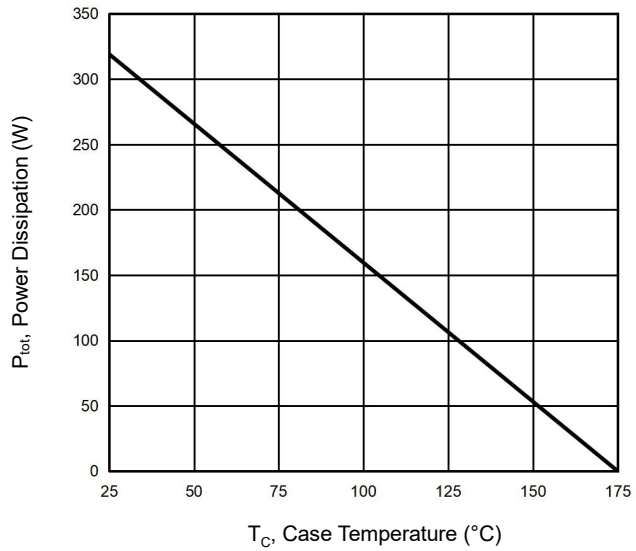
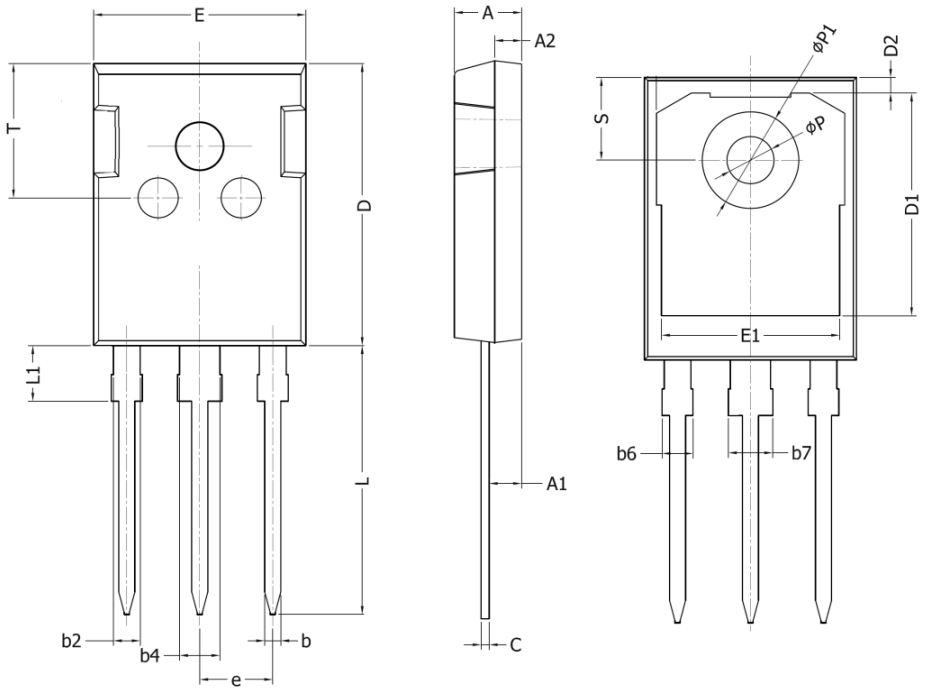


Figure 16 P_{tot} vs. Case Temperature



TO-247 Package Outline Dimensions



Symbol	Dimensions In Millimeters	
	Min.	Max.
A	4.90	5.20
A1	2.31	2.51
A2	1.9	2.1
b	1.16	1.26
b2	1.96	2.06
b4	2.96	3.06
b6	-	2.25
b7	-	3.25
C	0.59	0.66
D	20.90	21.20
D1	16.25	16.85
D2	1.05	1.35
E	15.75	16.10
E1	13.00	13.60
e	5.436 BSC	
L	19.80	20.20
L1	-	4.30
P	3.40	3.60
P1	7.00	7.40
S	6.05	6.25
T	9.80	10.20