ON Semiconductor®

FGD4536

360 V PDP Trench IGBT

Features

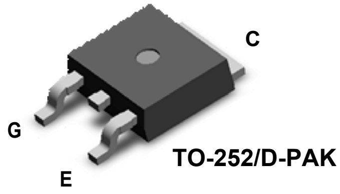
- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.59 V @ I_C = 50 A
- High Input Impedance
- Fast Switching
- RoHS Compliant

Applications

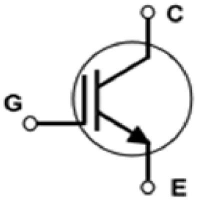
- PDP TV, Consumer Appliances

General Description

Using novel trench IGBT technology, ON Semiconductor's new series of trench IGBTs offer the optimum performance for consumer appliances and PDP TV applications where low conduction and switching losses are essential.



TO-252/D-PAK



Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V_{CES}	Collector to Emitter Voltage		360	V
V_{GES}	Gate to Emitter Voltage		± 30	V
$I_{C\ pulse(1)*}$	Pulsed Collector Current	@ T_C = 25^{o}C	220	A
P_D	Maximum Power Dissipation	@ T_C = 25^{o}C	125	W
	Maximum Power Dissipation	@ T_C = 100^{o}C	50	W
T_J	Operating Junction Temperature		-55 to +150	^{o}C
T_{stg}	Storage Temperature Range		-55 to +150	^{o}C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	^{o}C

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	-	1.0	^{o}C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	62.5	^{o}C/W

Notes:

(1) Half Sine Wave, D < 0.01, pluse width < 1µsec

* Ic_pluse limited by max Tj

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGD4536	FGD4536TM	TO252(D-PAK)	380 mm	16 mm	-
FGD4536	FGD4536TM-F065	TO252(D-PAK)	380 mm	16 mm	-

Electrical Characteristics of the IGBT T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
BV_{CES}	Collector to Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250 μA	360	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 250 μA	-	0.4	-	V/°C
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}$, V_{GE} = 0 V	-	-	100	μA
I_{GES}	G-E Leakage Current	$V_{GE} = V_{GES}$, V_{CE} = 0 V	-	-	±400	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 250 μA, $V_{CE} = V_{GE}$	2.4	3.3	4.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 20 A, V_{GE} = 15 V	-	1.19	-	V
		I_C = 30 A, V_{GE} = 15 V	-	1.33	-	V
		I_C = 50 A, V_{GE} = 15 V, T_C = 25°C	-	1.59	1.8	V
		I_C = 50 A, V_{GE} = 15 V, T_C = 125°C	-	1.66	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	-	1295	-	pF
C_{oes}	Output Capacitance		-	56	-	pF
C_{res}	Reverse Transfer Capacitance		-	43	-	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200 V, I_C = 20 A, R_G = 5 Ω, V_{GE} = 15 V, Resistive Load, T_C=25°C	-	5	-	ns
t_r	Rise Time		-	20	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	41	-	ns
t_f	Fall Time		-	182	-	ns
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 200 V, I_C = 20 A, R_G = 5 Ω, V_{GE} = 15 V, Resistive Load, T_C = 125°C	-	5	-	ns
t_r	Rise Time		-	21	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	43	-	ns
t_f	Fall Time		-	249	-	ns
Q_g	Total Gate Charge	V_{CE} = 200 V, I_C = 20 A, V_{GE} = 15 V	-	47	-	nC
Q_{ge}	Gate to Emitter Charge		-	5.4	-	nC
Q_{gc}	Gate to Collector Charge		-	15	-	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

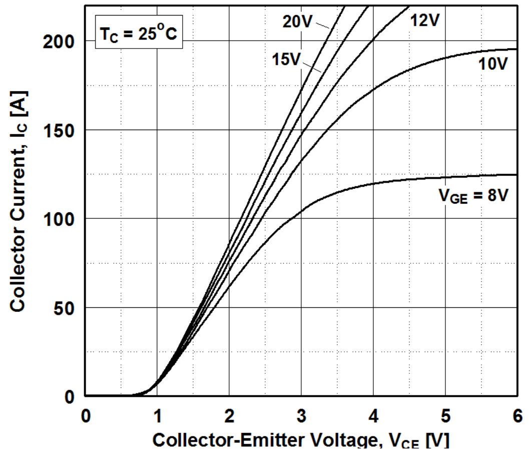


Figure 2. Typical Output Characteristics

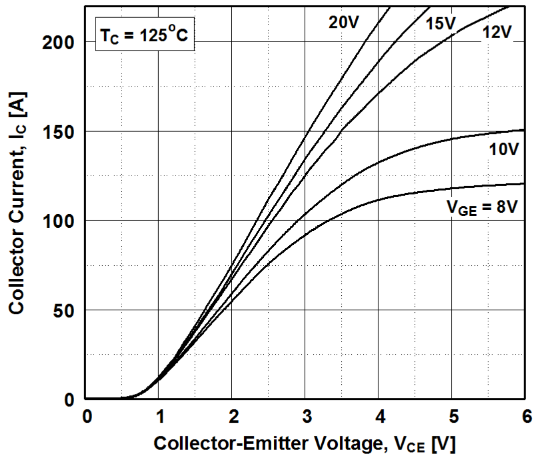


Figure 3. Typical Saturation Voltage Characteristics

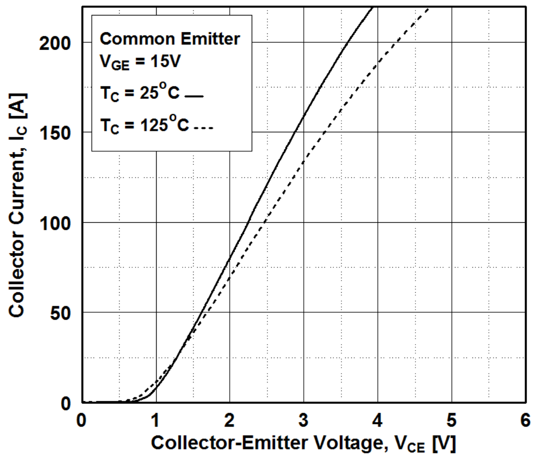


Figure 4. Transfer Characteristics

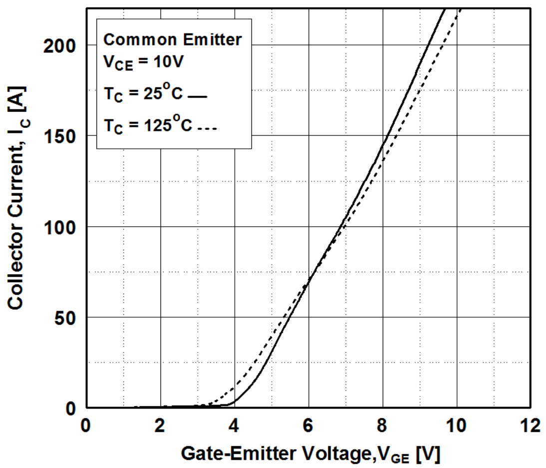


Figure 5. Saturation Voltage vs. V_{GE}

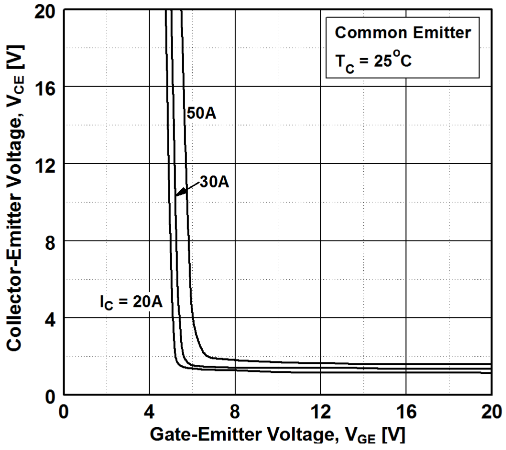
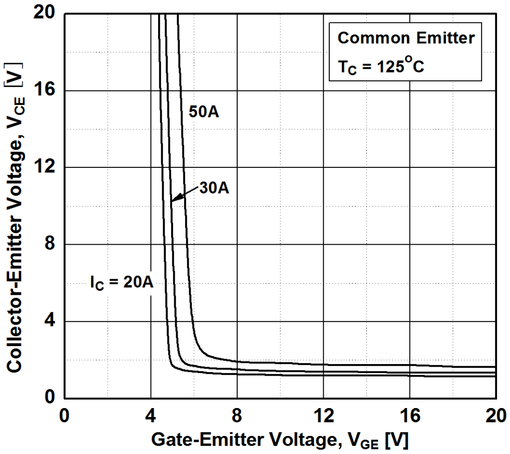


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. Case Temperature at Variant Current Level

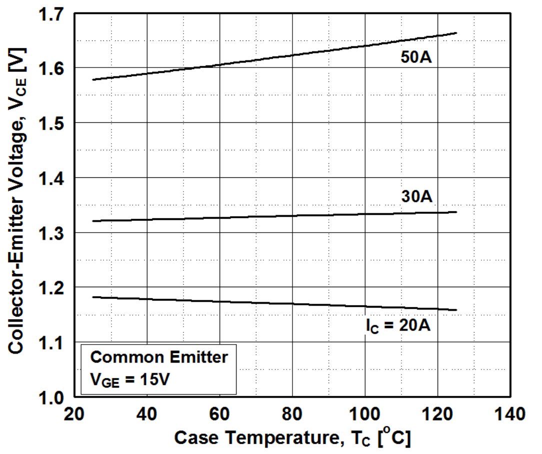


Figure 8. Capacitance Characteristics

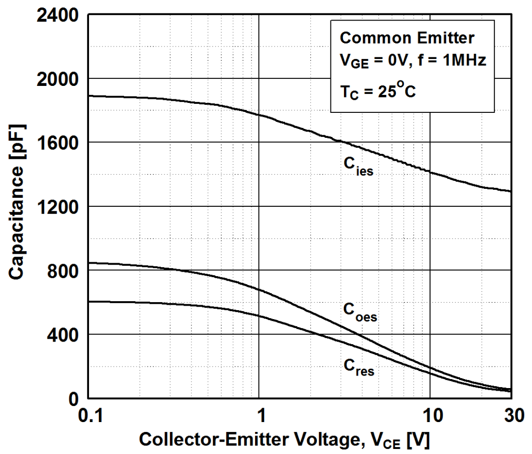


Figure 9. Gate charge Characteristics

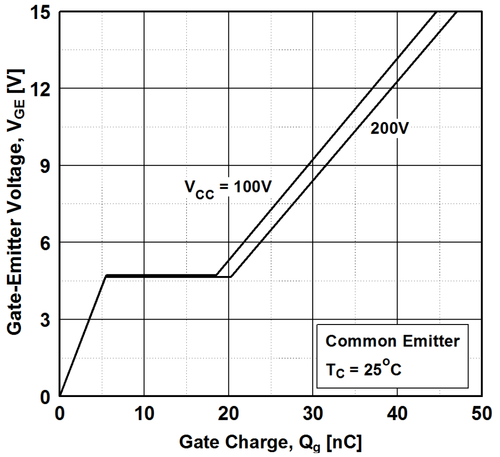
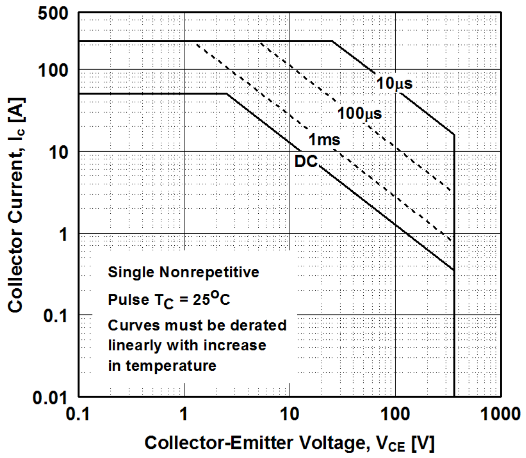


Figure 10. SOA Characteristics



Fgure 11. Turn-on Characteristics vs. Gate Resistance

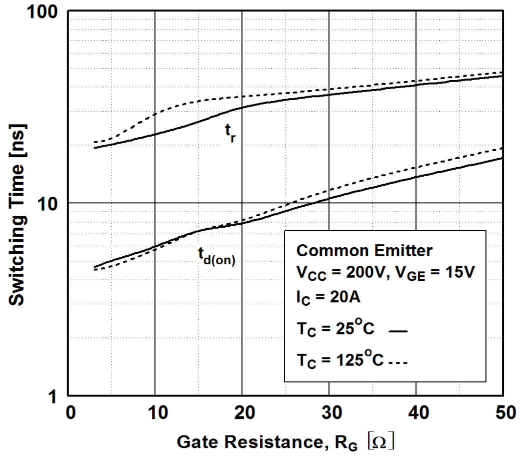
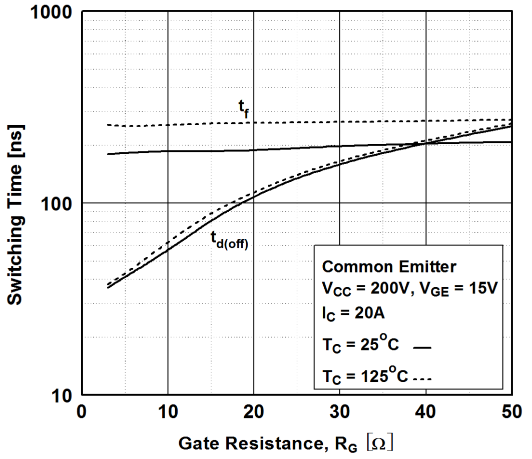


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Collector Current

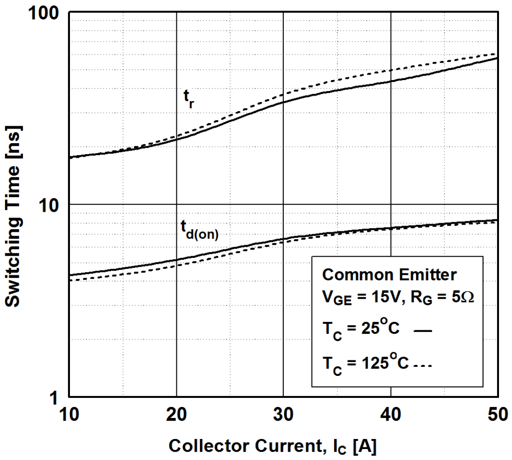


Figure 14. Turn-off Characteristics vs. Collector Current

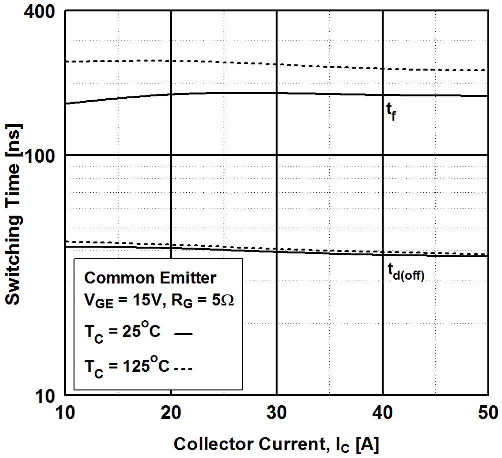


Figure 15. Switching Loss vs. Gate Resistance

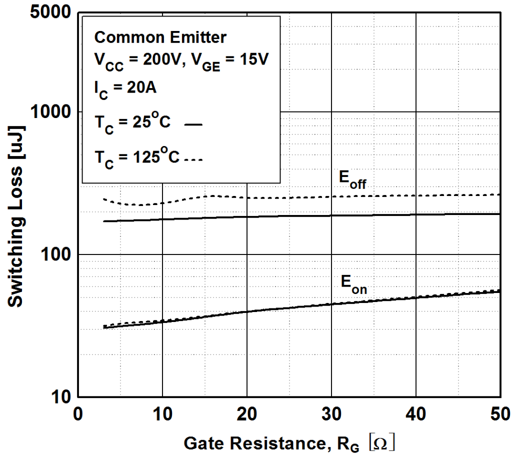


Figure 16. Switching Loss vs. Collector Current

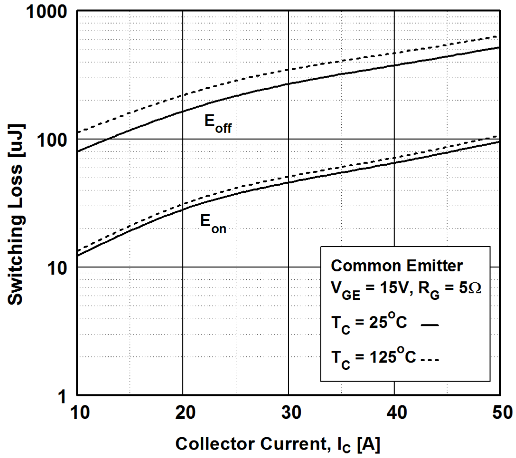
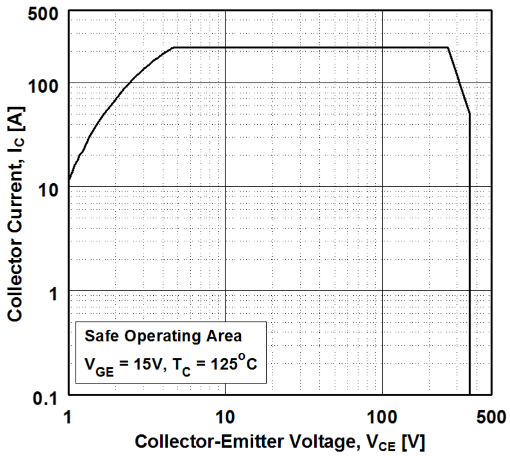
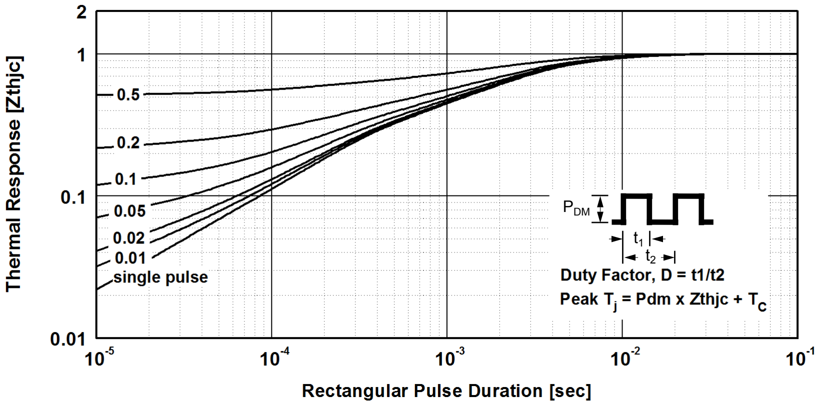


Figure 17. Turn off Switching SOA Characteristics

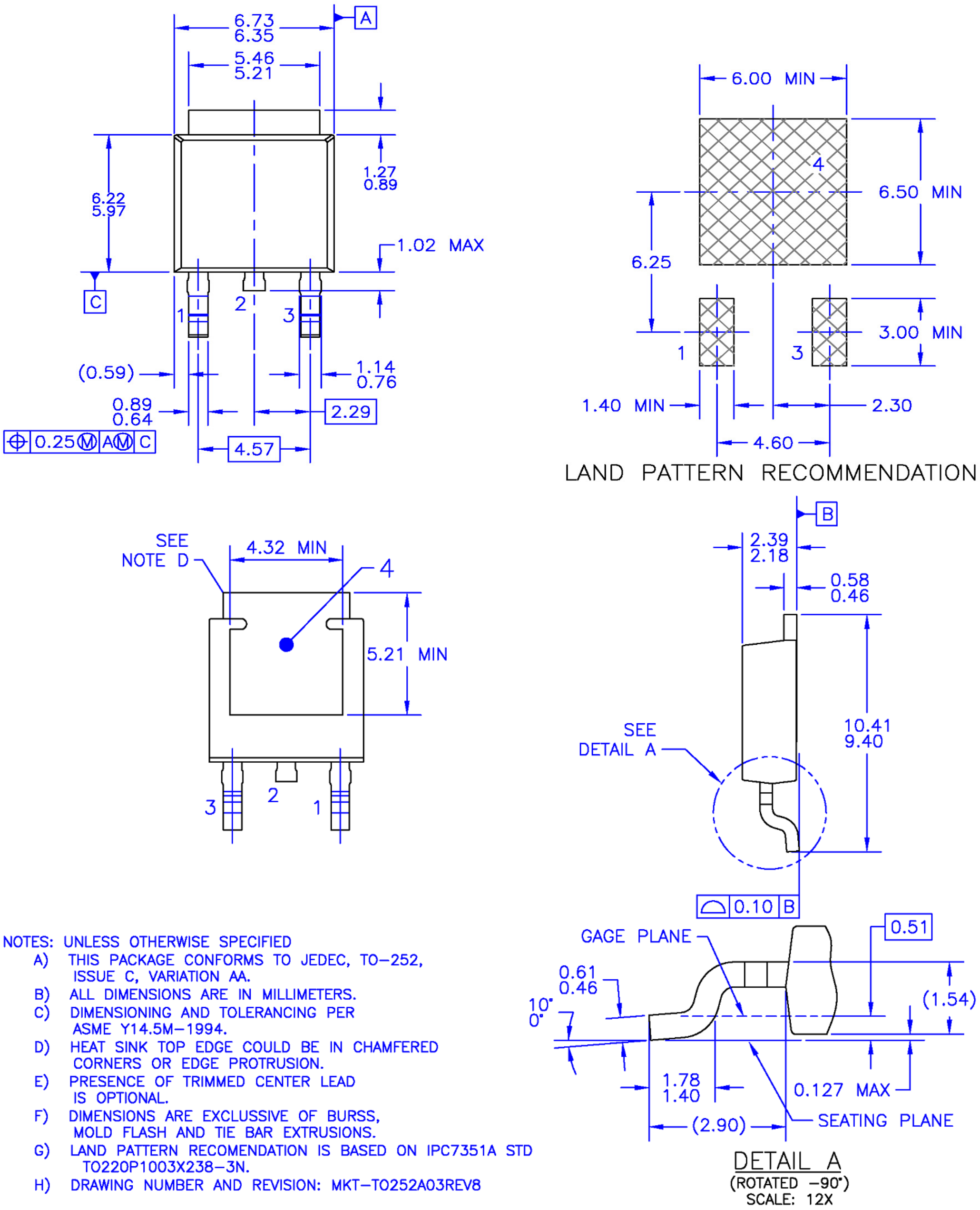


Typical Performance Characteristics

Figure 18.Transient Thermal Impedance of IGBT



Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

A) THIS PACKAGE CONFORMS TO JEDEC, TO-252, ISSUE C, VARIATION AA.
B) ALL DIMENSIONS ARE IN MILLIMETERS.
C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M-1994.
D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.
E) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.
F) DIMENSIONS ARE EXCLUSSIVE OF BURSS, MOLD FLASH AND TIE BAR EXTRUSIONS.
G) LAND PATTERN RECOMENDATION IS BASED ON IPC7351A STD TO220P1003X238-3N.
H) DRAWING NUMBER AND REVISION: MKT-TO252A03REV8

Figure 19. TO252 (D-PAK), MOLDED, 3 LEAD,OPTION AA&AB

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Dimensions in Millimeters

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