

FGA30N60LSD

600 V, 30 A PT IGBT

Features

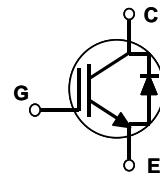
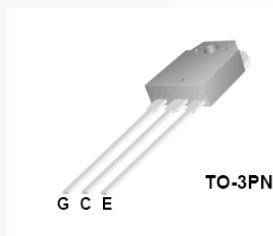
- Low Saturation Voltage: $V_{CE(sat)} = 1.1 \text{ V @ } I_C = 30 \text{ A}$
- High Input Impedance
- Low Conduction Loss

Applications

- Solar Inverter, UPS

General Description

Using Fairchild's advanced PT technology, the FGA30N60LSD IGBT offers superior conduction performances, which offer the optimum performance for medium switching application such as solar inverter, UPS applications where low conduction losses are the most important factor.



Absolute Maximum Ratings

Symbol	Description	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	600	V
V_{GES}	Gate-Emitter Voltage	± 20	V
I_C	Collector Current @ $T_C = 25^\circ\text{C}$	60	A
	Collector Current @ $T_C = 100^\circ\text{C}$	30	A
$I_{CM(1)}$	Pulsed Collector Current	90	A
I_{FSM}	Non-repetitive Peak Surge Current 60Hz Single Half-Sine Wave	150	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	480	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	192	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ\text{C}$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ\text{C}$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

Notes :

(1) Repetitive rating : Pulse width limited by max. junction temperature

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction-to-Case	--	0.26	$^\circ\text{C/W}$
$R_{\theta JC}(\text{Diode})$	Thermal Resistance, Junction-to-Case	--	0.92	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	$^\circ\text{C/W}$

Package Marking and Ordering Information

Part Number	Top Mark	Package	Packing Method	Reel Size	Tape Width	Quantity
FGA30N60LSDTU	FGA30N60LSD	TO-3P	Tube	N/A	N/A	30

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-Emitter Breakdown Voltage	V _{GE} = 0 V, I _C = 250 μA	600	--	--	V
ΔB _{V_{CES}} / ΔT _J	Temperature Coefficient of Breakdown Voltage	V _{GE} = 0 V, I _C = 250 μA	--	0.6	--	V/°C
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0 V	--	--	250	μA
I _{GES}	G-E Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0 V	--	--	±250	nA
On Characteristics						
V _{GE(th)}	G-E Threshold Voltage	I _C = 250 μA, V _{CE} = V _{GE}	4.0	5.5	7.0	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 30 A, V _{GE} = 15 V	--	1.1	1.4	V
		I _C = 30 A, V _{GE} = 15 V, T _C = 125°C	--	1.0	--	V
		I _C = 60 A, V _{GE} = 15 V	--	1.3	--	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 30 V, V _{GE} = 0 V, f = 1 MHz	--	3550	--	pF
C _{oes}	Output Capacitance		--	245	--	pF
C _{res}	Reverse Transfer Capacitance		--	90	--	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 400 V, I _C = 30 A, R _G = 6.8 Ω, V _{GE} = 15 V, Inductive Load, T _C = 25°C	--	18	--	ns
t _r	Rise Time		--	46	--	ns
t _{d(off)}	Turn-Off Delay Time		--	250	--	ns
t _f	Fall Time		--	1.3	2.0	us
E _{on}	Turn-On Switching Loss		--	1.1	--	mJ
E _{off}	Turn-Off Switching Loss		--	21	--	mJ
t _{d(on)}	Turn-On Delay Time	V _{CC} = 400 V, I _C = 30 A, R _G = 6.8 Ω, V _{GE} = 15 V, Inductive Load, T _C = 125°C	--	17	--	ns
t _r	Rise Time		--	45	--	ns
t _{d(off)}	Turn-Off Delay Time		--	270	--	ns
t _f	Fall Time		--	2.6	--	us
E _{on}	Turn-On Switching Loss		--	1.1	--	mJ
E _{off}	Turn-Off Switching Loss		--	36	--	mJ
Q _g	Total Gate Charge	V _{CE} = 300 V, I _C = 30 A, V _{GE} = 15 V	--	225	--	nC
Q _{ge}	Gate-Emitter Charge		--	30	--	nC
Q _{gc}	Gate-Collector Charge		--	105	--	nC
L _e	Internal Emitter Inductance	Measured 5mm from PKG	--	7	--	nH

Electrical Characteristics of the Diode $T_C = 25^\circ\text{C}$ unless otherwise noted

Parameter	Conditions	Min.	Typ.	Max	Unit	
V_{FM}	$I_F = 15\text{ A}$	-	1.8	2.2	V	
	$I_F = 15\text{ A}$	-	1.6	-	V	
I_{RM}	$V_R = 600\text{ V}$	-	-	100	μA	
t_{rr}	$I_F = 1\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 30\text{ V}$	-	-	35	ns	
	$I_F = 15\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 390\text{ V}$	-	-	40	ns	
t_a t_b Q_{rr}	$I_F = 15\text{ A}$, $di_F/dt = 100\text{ A}/\mu\text{s}$, $V_R = 390\text{ V}$	$T_C = 25^\circ\text{C}$	-	18	-	ns
		$T_C = 25^\circ\text{C}$	-	13	-	ns
		$T_C = 25^\circ\text{C}$	-	27.5	-	nC



Typical Performance Characteristics

Figure 1. Typical Output Characteristics

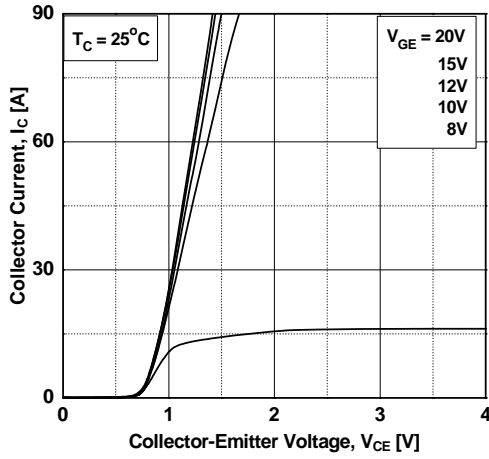


Figure 2. Typical Saturation Voltage Characteristics

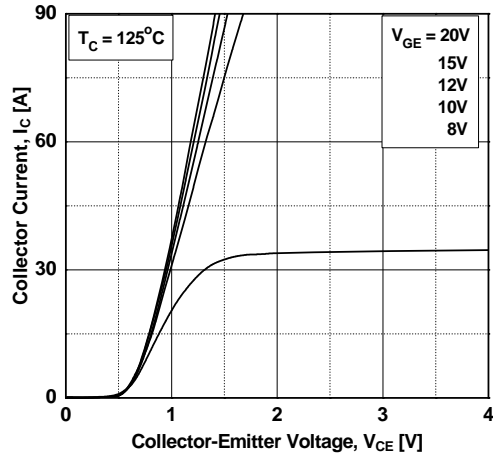


Figure 3. Typical Saturation Voltage Characteristics

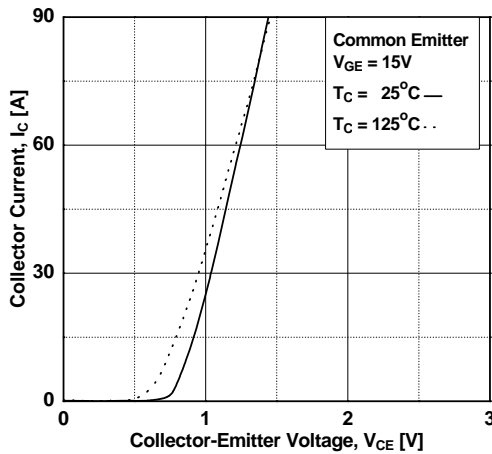


Figure 4. Transfer characteristics

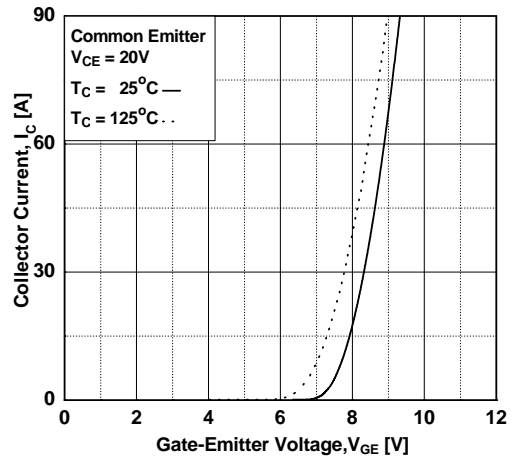


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

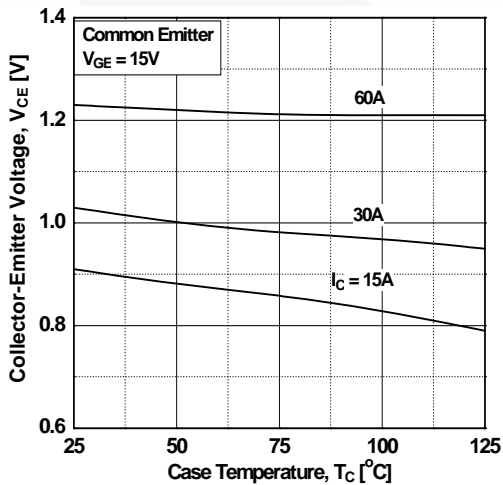
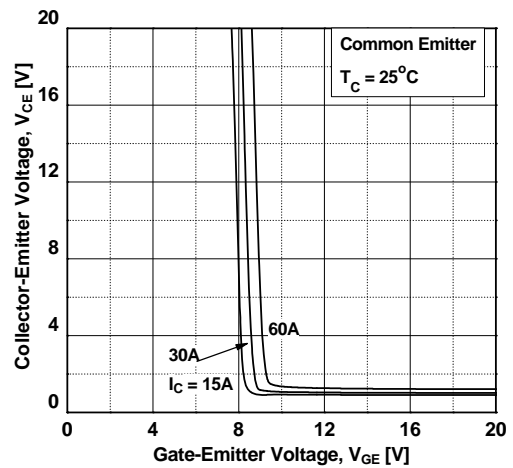


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. V_{GE}

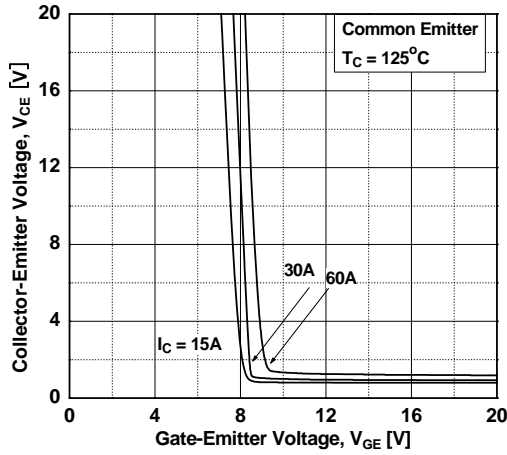


Figure 8. Capacitance characteristics

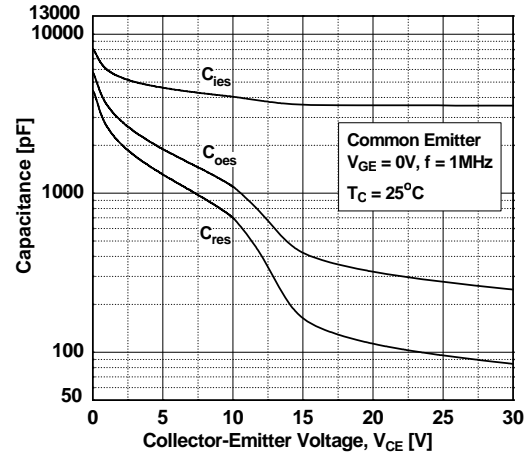


Figure 9. Gate Charge Characteristics

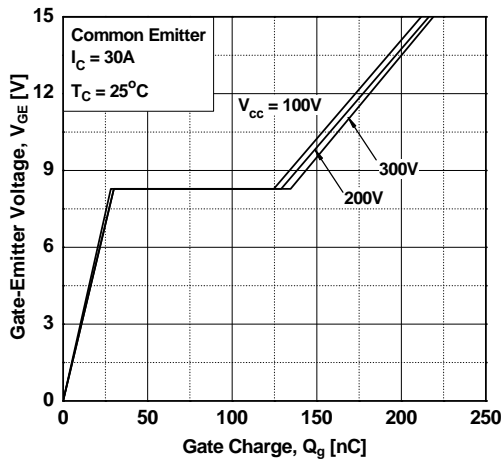


Figure 10. SOA Characteristics

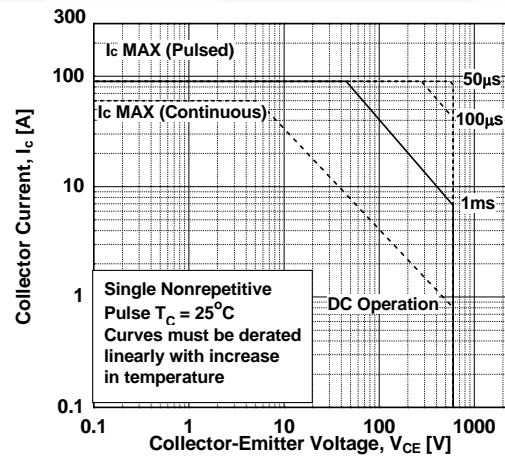


Figure 11. Load Current Vs. Frequency

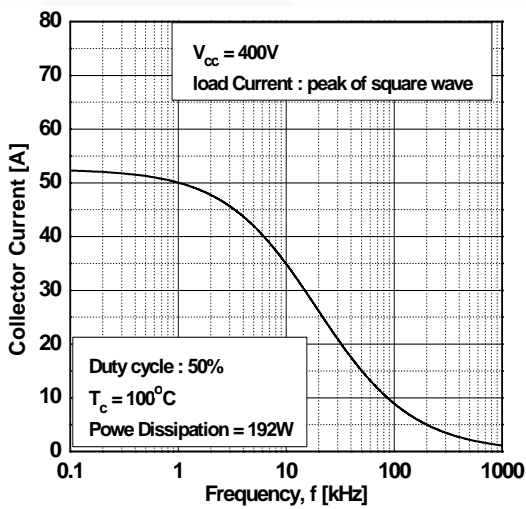
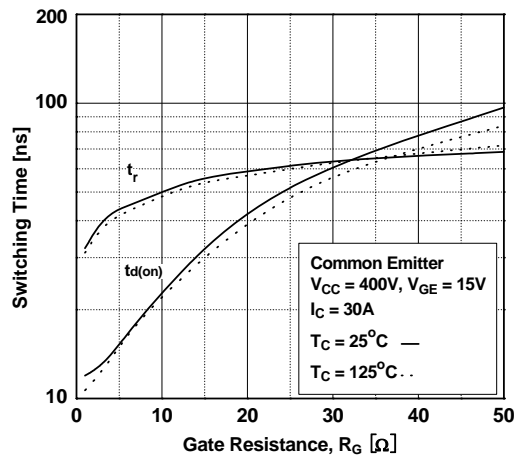


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

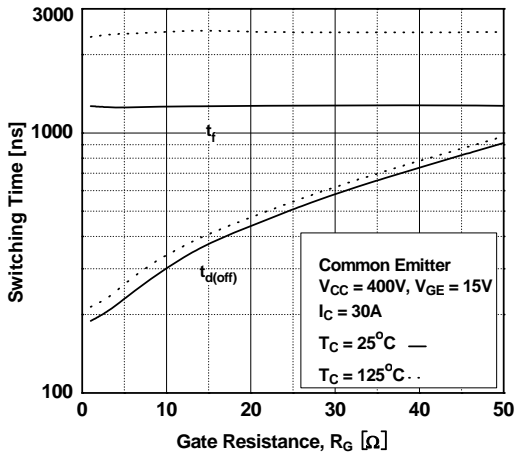


Figure 14. Turn-On Characteristics vs. Collector Current

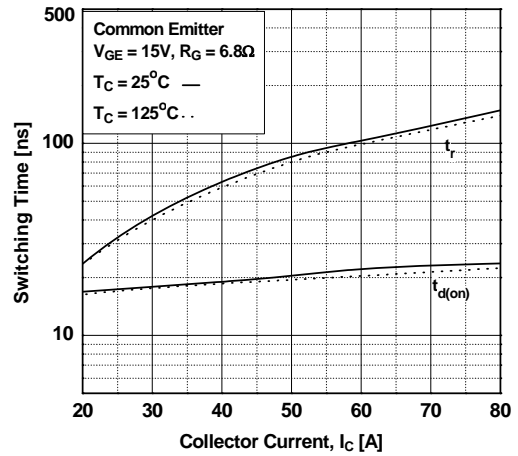


Figure 15. Turn-Off Characteristics vs. Collector Current

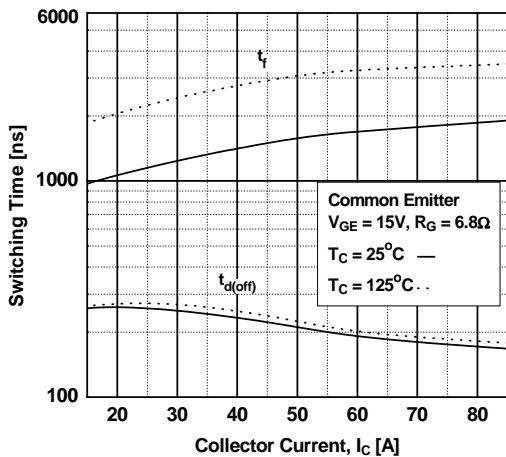


Figure 16. Switching Loss vs Gate Resistance

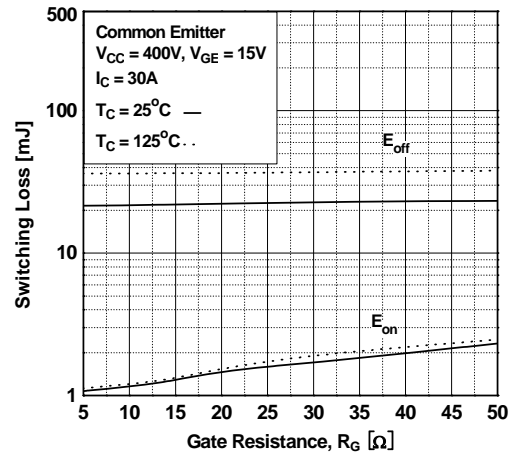


Figure 17. Switching Loss vs Collector Current

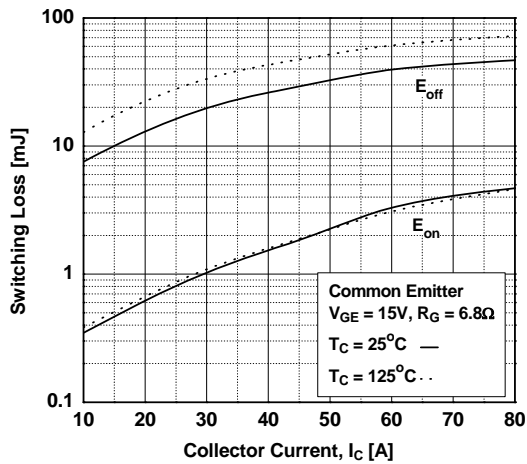


Figure 18. Turn-Off Switching

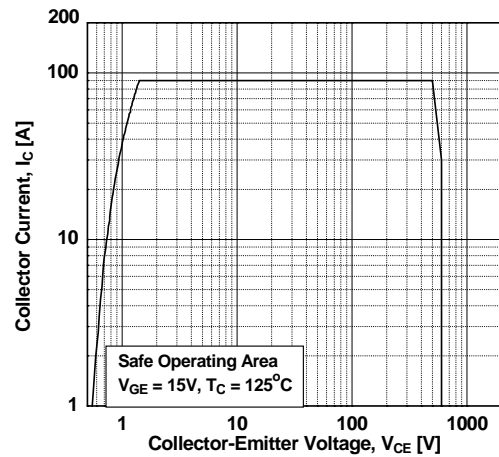


Figure 19. Transient Thermal Impedance of IGBT

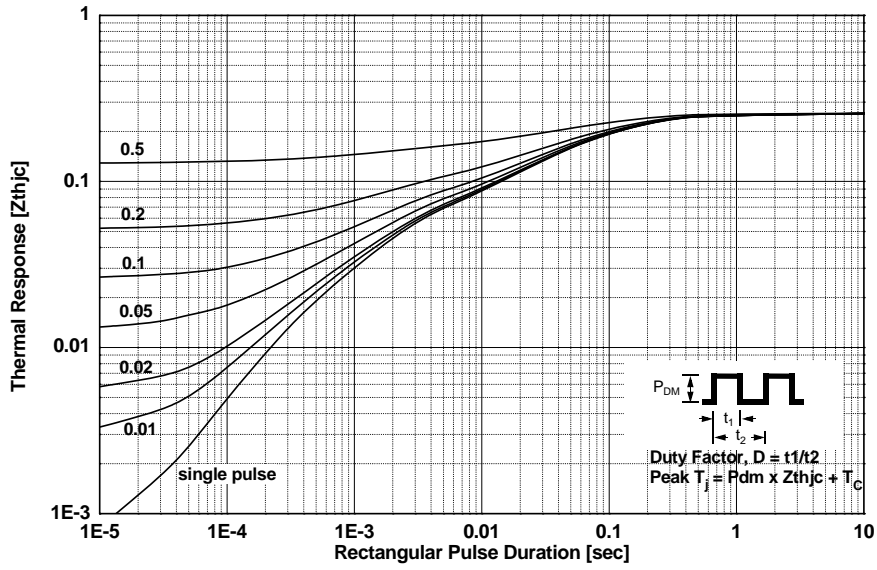


Figure 20. Forward Voltage Drop

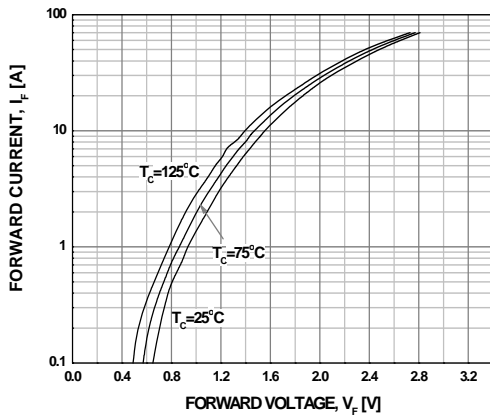


Figure 21. Reverse Current

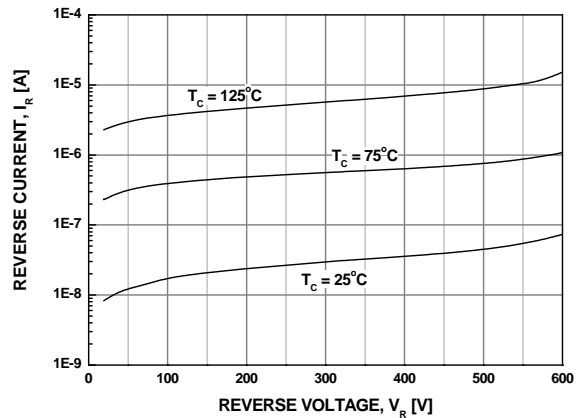
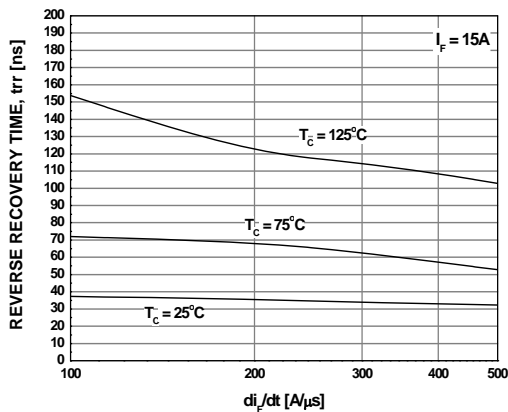
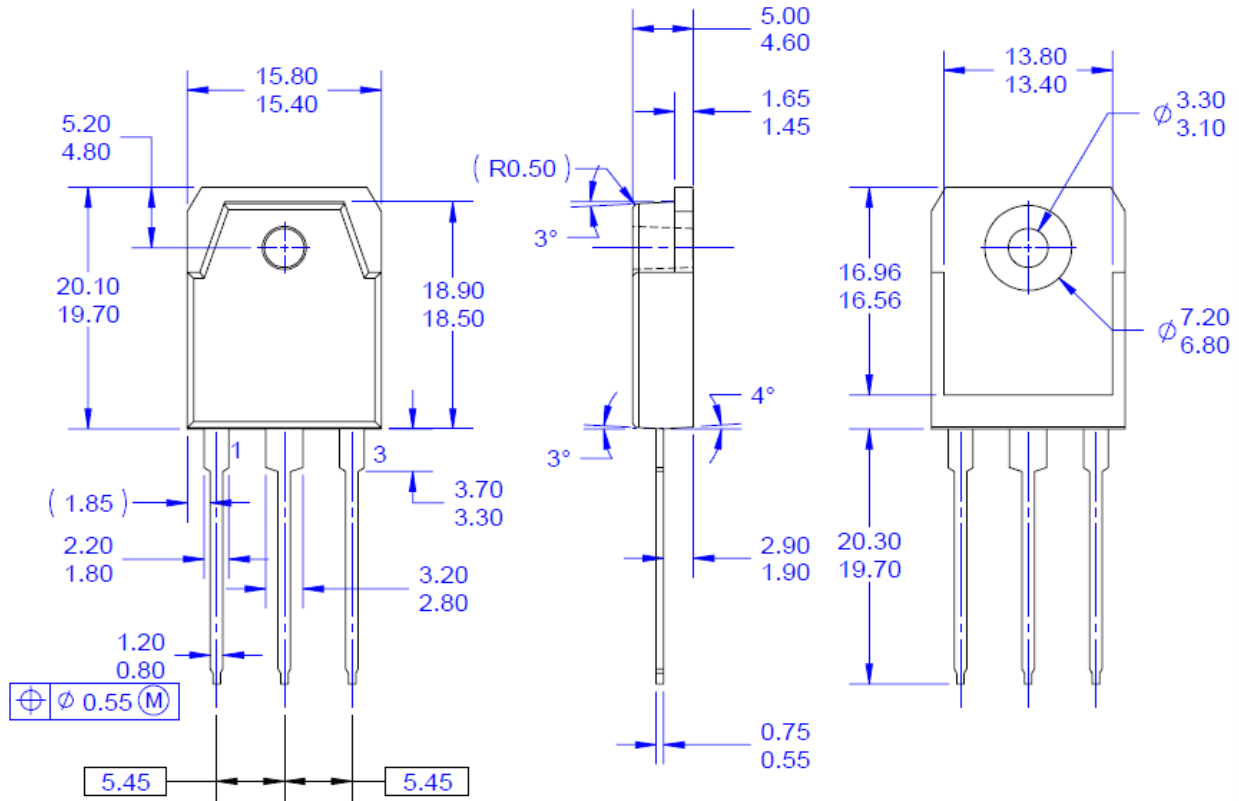


Figure 22. Reverse Recovery Time



Mechanical Dimensions



NOTES: UNLESS OTHERWISE SPECIFIED

- A) THIS PACKAGE CONFORMS TO EIAJ SC-65 PACKAGING STANDARD.
- B) ALL DIMENSIONS ARE IN MILLIMETERS.
- C) DIMENSION AND TOLERANCING PER ASME14.5
- D) DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
- E) THIS PACKAGE IS INTENDED ONLY FOR T03PN.
- F) DRAWING FILE NAME: T03P03AREV4.

Figure 23. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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