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FAIRCHILD SEMICONDUCTOR®

November 2013

FGA30N60LSD

600 V, 30 A PT IGBT

Features

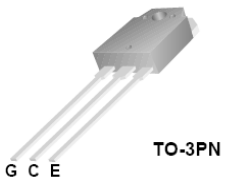
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.1 V @ I_C = 30 A
- High Input Impedance
- Low Conduction Loss

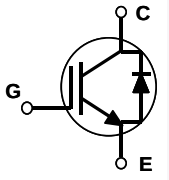
Applications

- 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°C	60	A
	Collector Current	@ T_C = 100°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°C	480	W
	Maximum Power Dissipation	@ T_C = 100°C	192	W
T_J	Operating Junction Temperature		-55 to +150	°C
T_{stg}	Storage Temperature Range		-55 to +150	°C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8” from case for 5 seconds		300	°C

Notes :

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

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction-to-Case	--	0.26	°C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction-to-Case	--	0.92	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°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 uA	600	--	--	V
$\Delta B_{VCES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 250 uA	--	0.6	--	V/°C
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0 V	--	--	250	uA
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 uA, 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°C unless otherwise noted

Parameter	Conditions		Min.	Typ.	Max	Unit
V_{FM}	I_F = 15 A I_F = 15 A	T_C = 25 °C T_C = 125 °C	- -	1.8 1.6	2.2 -	V V
I_{RM}	V_R = 600 V	T_C = 25 °C	-	-	100	μA
t_{rr}	I_F =1 A, di_F/dt = 100 A/μs, V_R = 30 V I_F =15 A, di_F/dt = 100 A/μs, V_R = 390 V	T_C = 25 °C T_C = 25 °C	- -	- -	35 40	ns ns
t_a t_b Q_{rr}	I_F =15 A, di_F/dt = 100 A/μs, V_R = 390 V	T_C = 25 °C T_C = 25 °C T_C = 25 °C	- - -	18 13 27.5	- - -	ns ns nC

Typical Performance Characteristics

Figure 1.Typical Output Characteristics

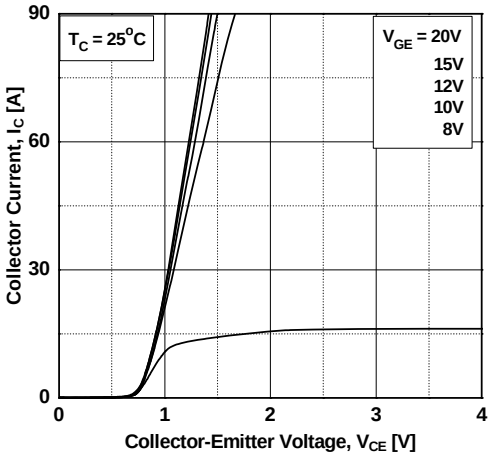


Figure 2. Typical Saturation Voltage Characteristics

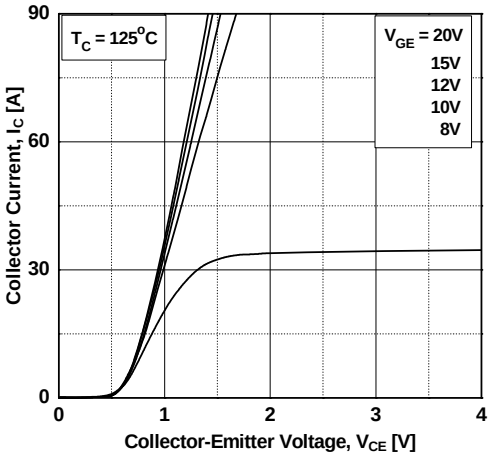


Figure 3. Typical Saturation Voltage Characteritics

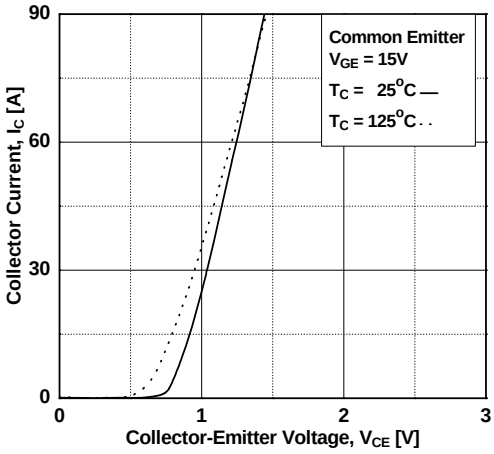


Figure 4. Transfer characteristics

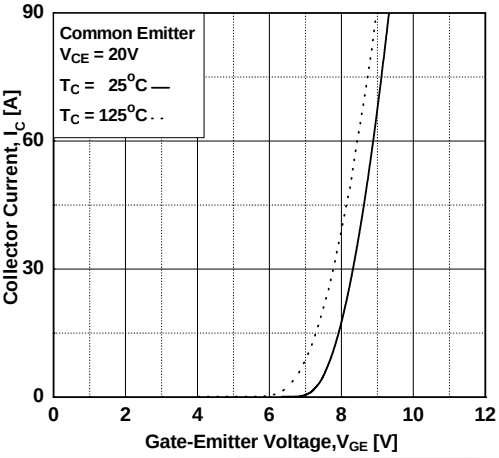


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

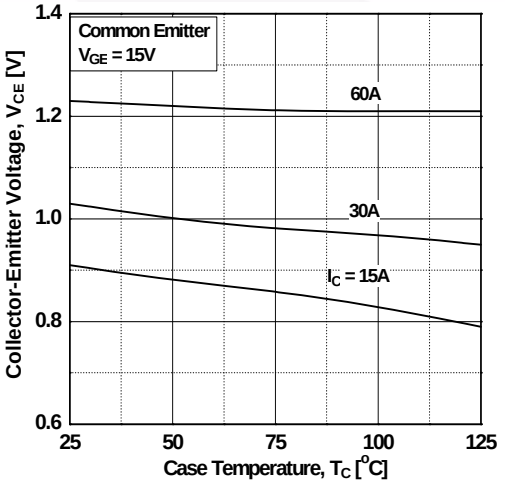
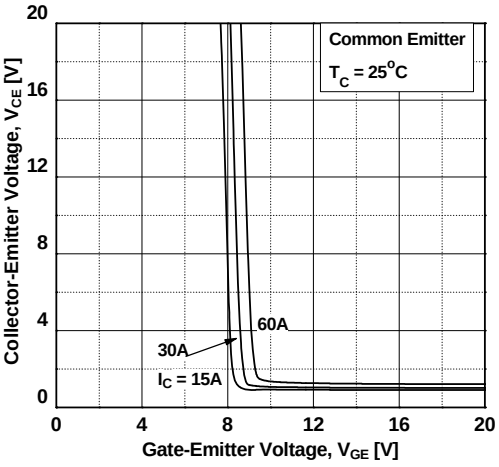


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. Vge

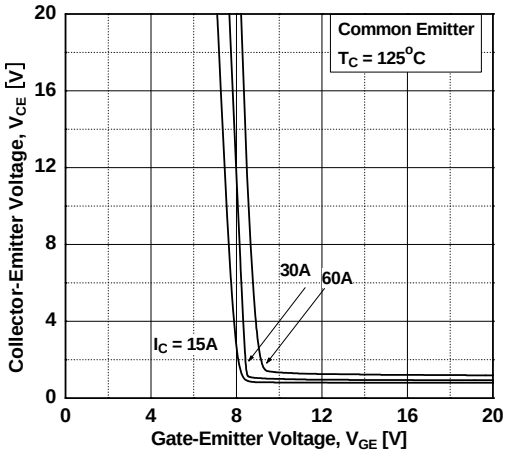


Figure 8. Capacitance characteristics

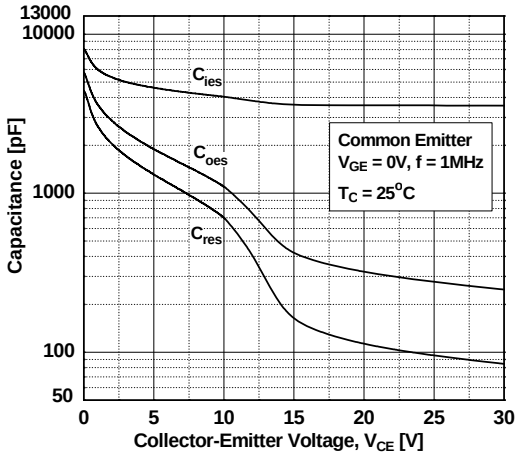


Figure 9. Gate Charge Characteristics

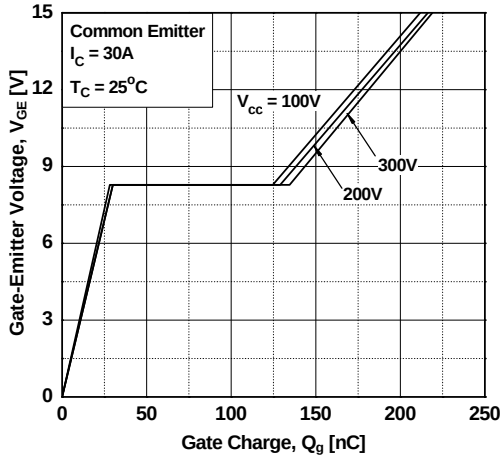


Figure 10. SOA Characteeristics

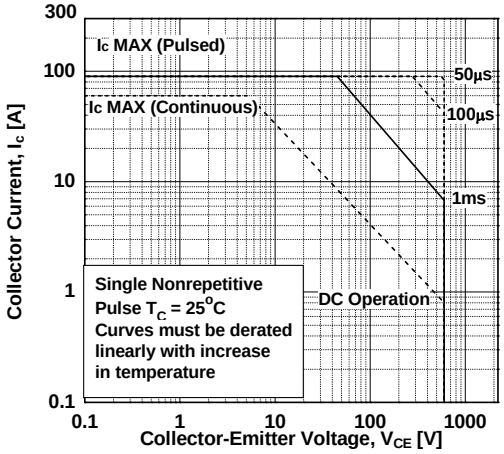


Figure 11. Load Current Vs. Frequency

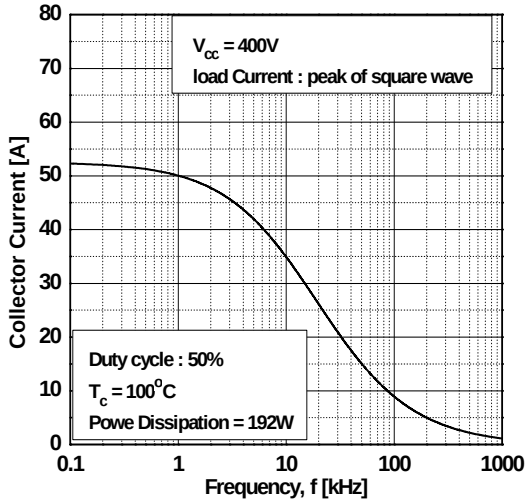
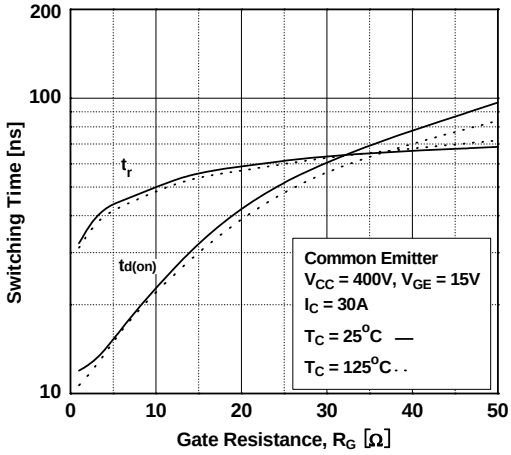


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

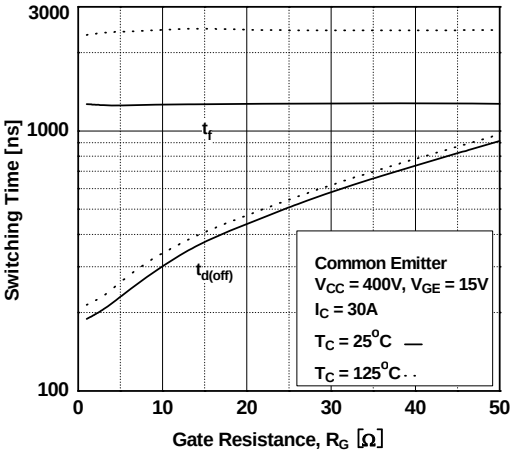


Figure 14. Turn-On Characteristics vs. Collector Current

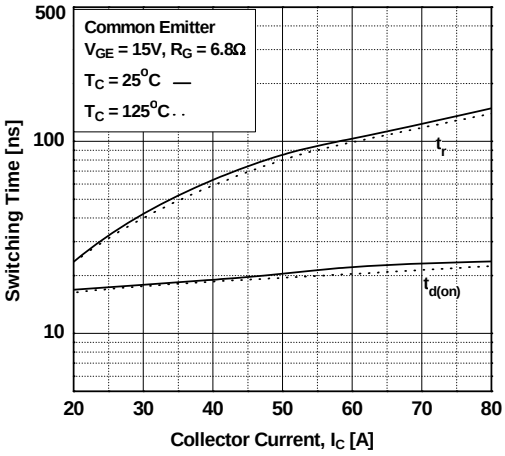


Figure 15. Turn-Off Characteristics vs. Collector Current

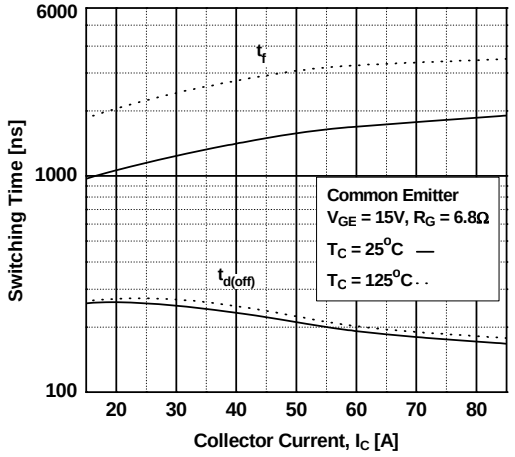


Figure 16. Switching Loss vs Gate Resistance

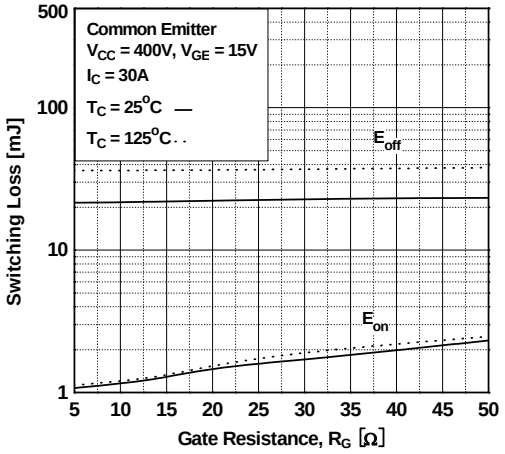


Figure 17.Switching Loss vs Collector Current

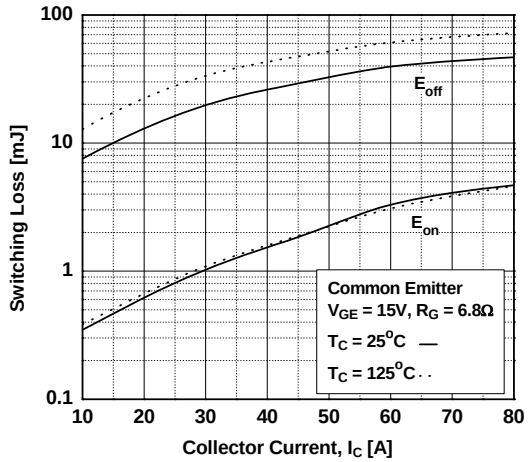


Figure 18. Turn-Off Switching

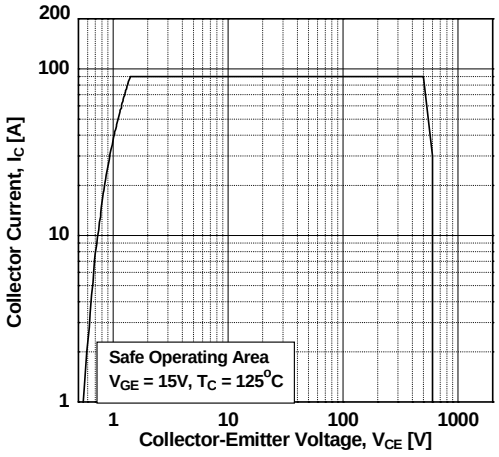


Figure 19. Transient Thermal Impedance of IGBT

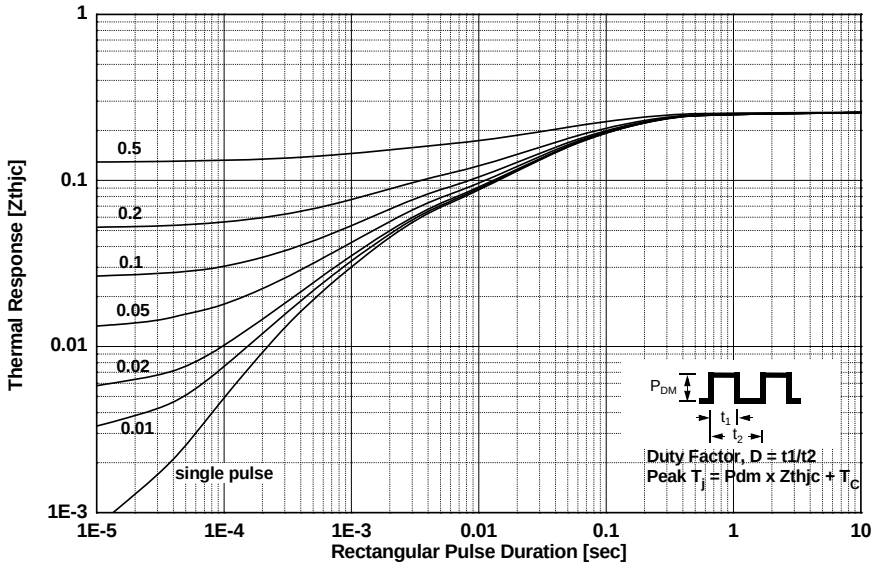


Figure 20. Forward Voltage Drop

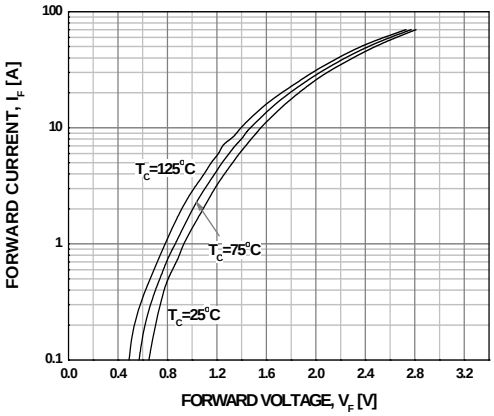


Figure 21. Reverse Current

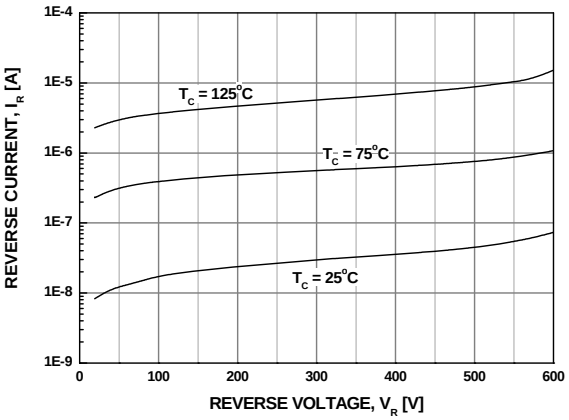
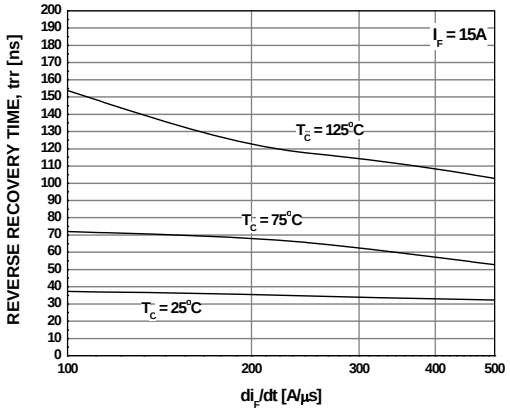


Figure 22. Reverse Recovery Time



Mechanical Dimensions

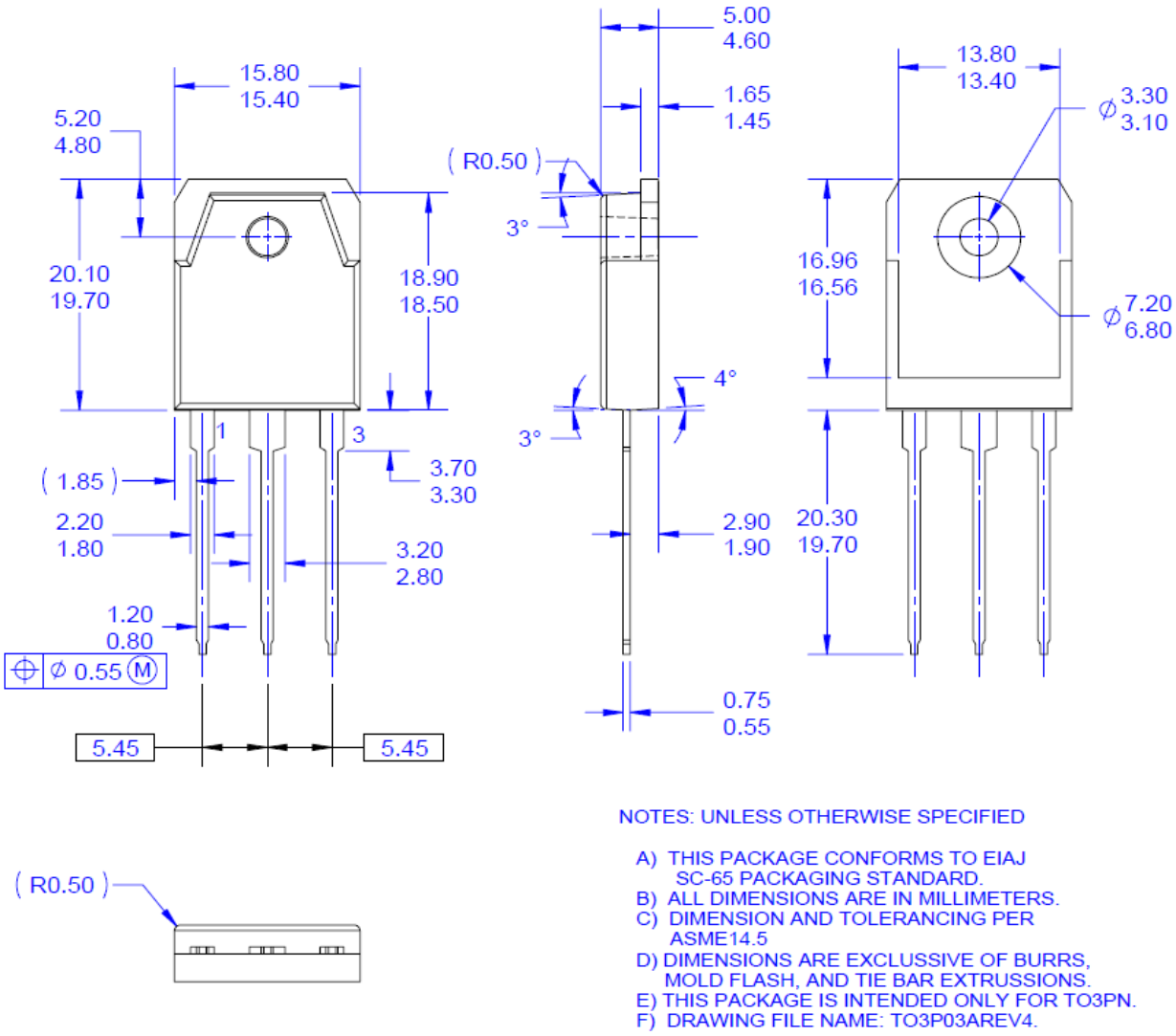


Figure 23. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative / In Design	Datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	Datasheet contains preliminary data; supplementary data will be published at a later date. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve design.
No Identification Needed	Full Production	Datasheet contains final specifications. Fairchild Semiconductor reserves the right to make changes at any time without notice to improve the design.
Obsolete	Not In Production	Datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. I66

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