FAIRCHILD SEMICONDUCTOR®

November 2013

FGA25N120ANTD

1200 V, 25 A NPT Trench IGBT

Features

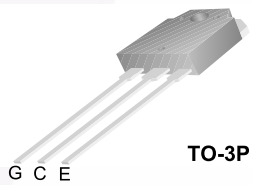
- NPT Trench Technology, Positive Temperature Coefficient
- Low Saturation Voltage: $V_{CE(sat),\ typ}$ = 2.0 V @ I_C = 25 A and T_C = 25°C
- Low Switching Loss: $E_{off,\ typ}$ = 0.96 mJ @ I_C = 25 A and T_C = 25°C
- Extremely Enhanced Avalanche Capability

Applications

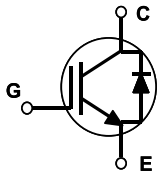
- Induction Heating, Microwave Oven

Description

Using Fairchild's proprietary trench design and advanced NPT technology, the 1200V NPT IGBT offers superior conduction and switching performances, high avalanche ruggedness and easy parallel operation. This device is well suited for the resonant or soft switching application such as induction heating, microwave oven.



TO-3P



Absolute Maximum Ratings

Symbol	Description		Ratings	Unit
V_{CES}	Collector-Emitter Voltage		1200	V
V_{GES}	Gate-Emitter Voltage		± 20	V
I_C	Collector Current	@ T_C = 25°C	50	A
	Collector Current	@ T_C = 100°C	25	A
$I_{CM\ (1)}$	Pulsed Collector Current		90	A
I_F	Diode Continuous Forward Current	@ T_C = 25°C	50	A
	Diode Continuous Forward Current	@ T_C = 100°C	25	A
I_{FM}	Diode Maximum Forward Current		150	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	312	W
	Maximum Power Dissipation	@ T_C = 100°C	125	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	--	0.4	°C/W
$R_{\theta JC}$(DIODE)	Thermal Resistance, Junction-to-Case	--	2.0	°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
FGA25N120ANTDTU	FGA25N120ANTD	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						
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0 V	--	--	3	mA
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 = 25 mA, V_{CE} = V_{GE}	3.5	5.5	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 25 A, V_{GE} = 15 V	--	2.0	--	V
		I_C = 25 A, V_{GE} = 15 V, T_C = 125°C	--	2.15	--	V
		I_C = 50 A, V_{GE} = 15 V	--	2.65	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	--	3700	--	pF
C_{oes}	Output Capacitance		--	130	--	pF
C_{res}	Reverse Transfer Capacitance		--	80	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 25°C	--	50	--	ns
t_r	Rise Time		--	60	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	190	--	ns
t_f	Fall Time		--	100	--	ns
E_{on}	Turn-On Switching Loss		--	4.1	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.96	--	mJ
E_{ts}	Total Switching Loss		--	5.06	--	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 600 V, I_C = 25 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	--	50	--	ns
t_r	Rise Time		--	60	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	200	--	ns
t_f	Fall Time		--	154	--	ns
E_{on}	Turn-On Switching Loss		--	4.3	--	mJ
E_{off}	Turn-Off Switching Loss		--	1.5	--	mJ
E_{ts}	Total Switching Loss		--	5.8	--	mJ
Q_g	Total Gate Charge	V_{CE} = 600 V, I_C = 25 A, V_{GE} = 15 V	--	200	--	nC
Q_{ge}	Gate-Emitter Charge		--	15	--	nC
Q_{gc}	Gate-Collector Charge		--	100	--	nC

Electrical Characteristics of DIODE T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions		Min.	Typ.	Max.	Unit
V_{FM}	Diode Forward Voltage	I_F = 25 A	T_C = 25°C	--	2.0	3.0	V
			T_C = 125°C	--	2.1	--	
t_{rr}	Diode Reverse Recovery Time	I_F = 25 A di_F/dt = 200 A/μs	T_C = 25°C	--	235	350	ns
			T_C = 125°C	--	300	--	
I_{rr}	Diode Peak Reverse Recovery Current		T_C = 25°C	--	27	40	A
			T_C = 125°C	--	31	--	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	--	3130	4700	nC
			T_C = 125°C	--	4650	--	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

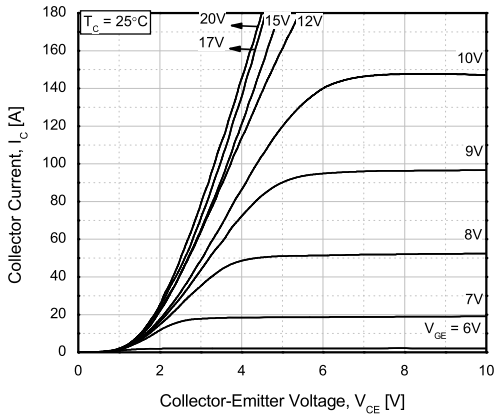


Figure 2. Typical Saturation Voltage Characteristics

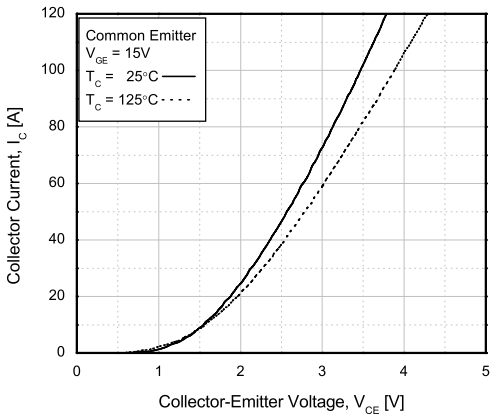


Figure 3. Saturation Voltage vs. Case Temperature at Variant Current Level

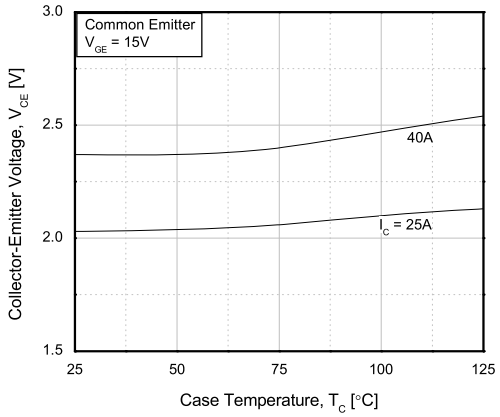


Figure 4. Saturation Voltage vs. V_{GE}

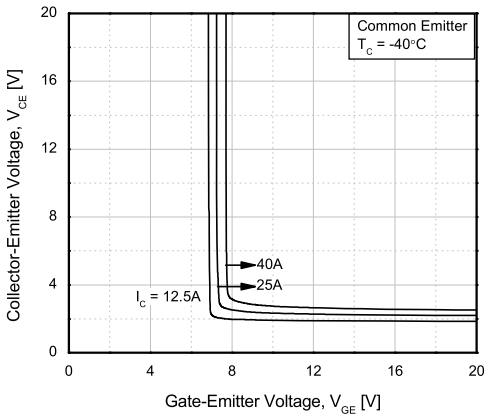


Figure 5. Saturation Voltage vs. V_{GE}

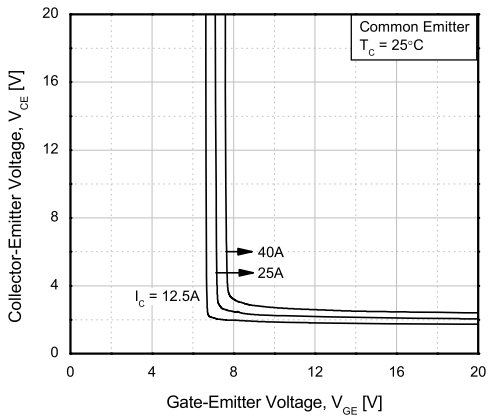
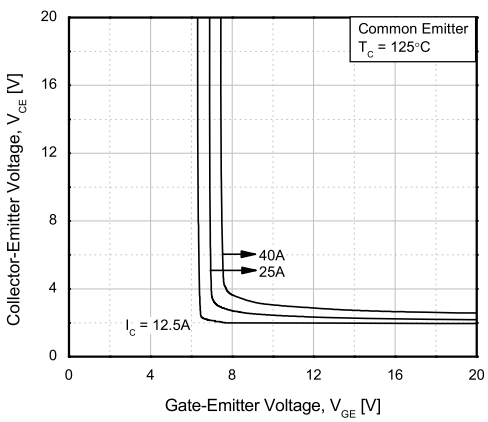


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics (Continued)

Figure 7. Capacitance Characteristics

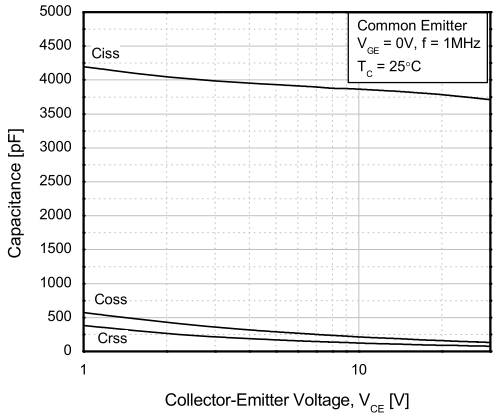


Figure 8. Turn-On Characteristics vs. Gate Resistance

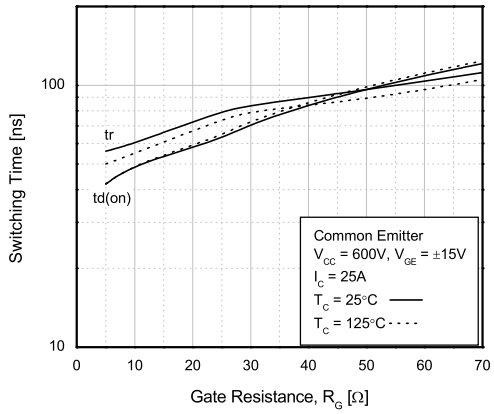


Figure 9. Turn-Off Characteristics vs. Gate Resistance

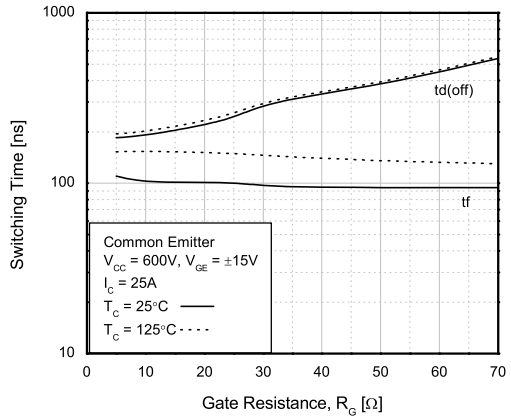


Figure 10. Switching Loss vs. Gate Resistance

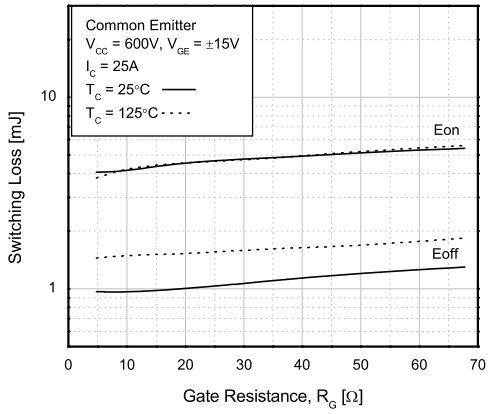


Figure 11. Turn-On Characteristics vs. Collector Current

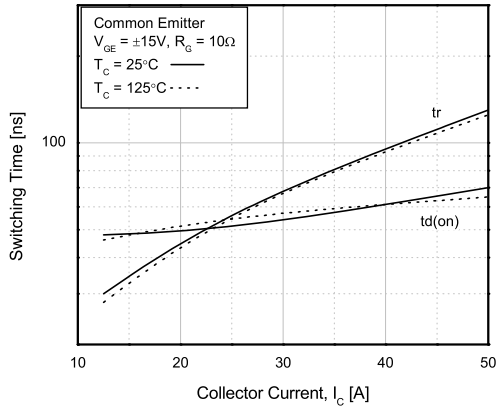
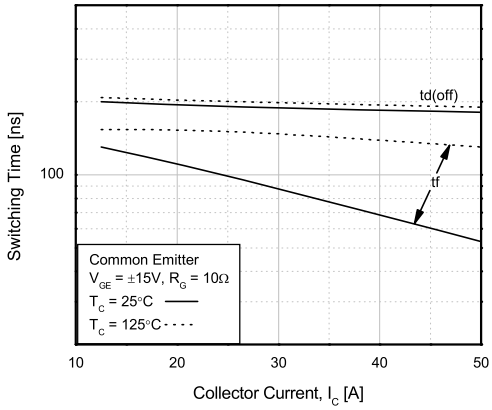


Figure 12. Turn-Off Characteristics vs. Collector Current



Typical Performance Characteristics (Continued)

Figure 13. Switching Loss vs. Collector Current

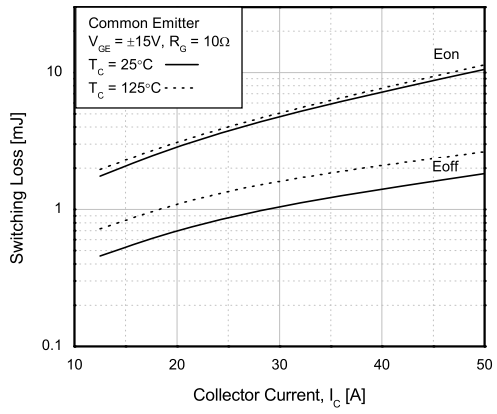


Figure 14. Gate Charge Characteristics

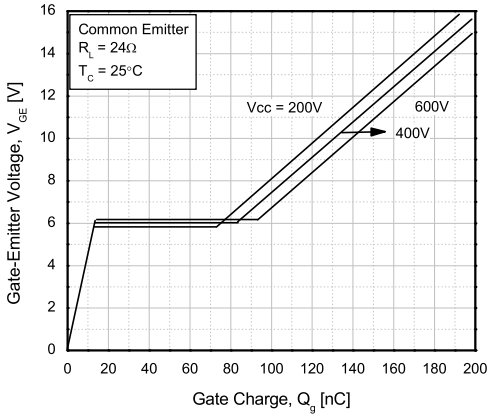


Figure 15. SOA Characteristics

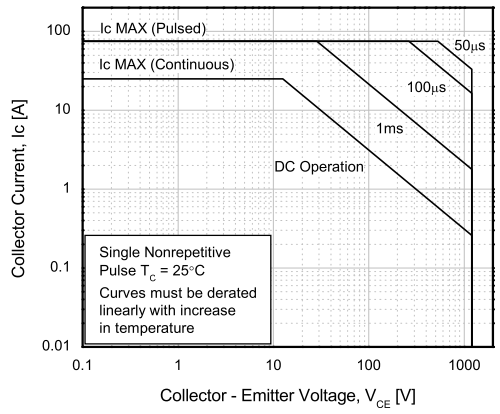


Figure 16. Turn-Off SOA

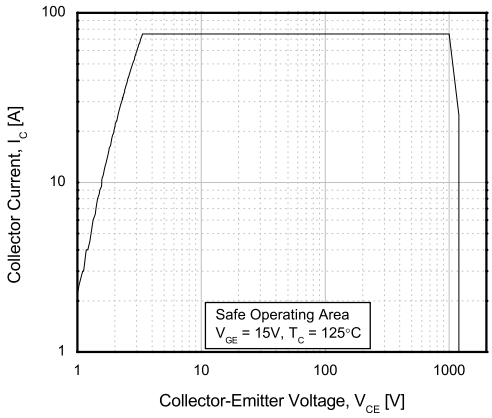
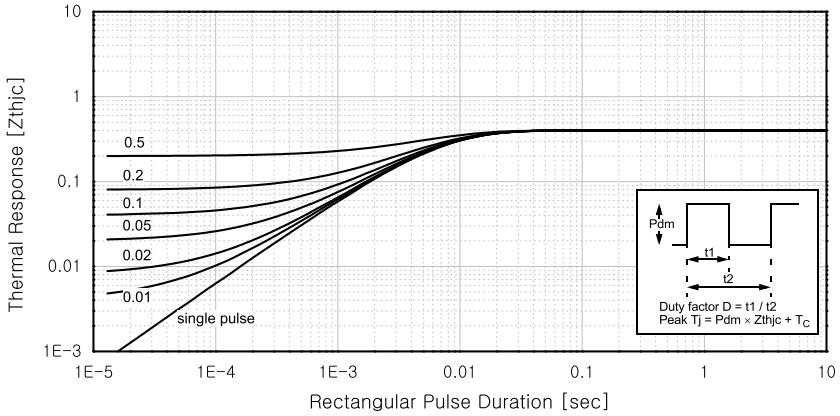


Figure 17. Transient Thermal Impedance of IGBT



Typical Performance Characteristics (Continued)

Figure 18. Forward Characteristics

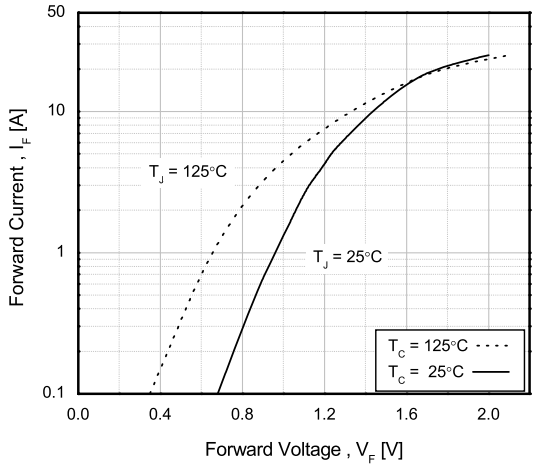


Figure 19. Reverse Recovery Current

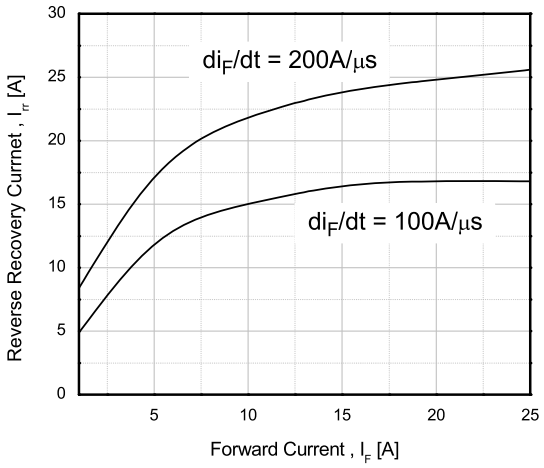


Figure 20. Stored Charge

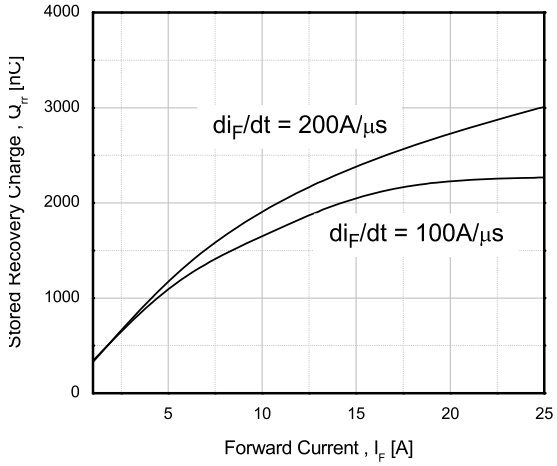
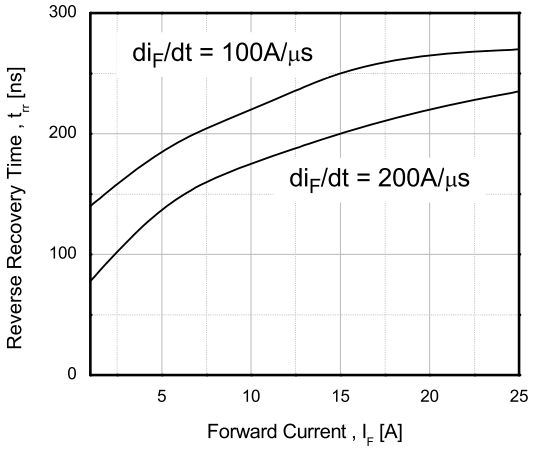


Figure 21. Reverse Recovery Time



Mechanical Dimensions

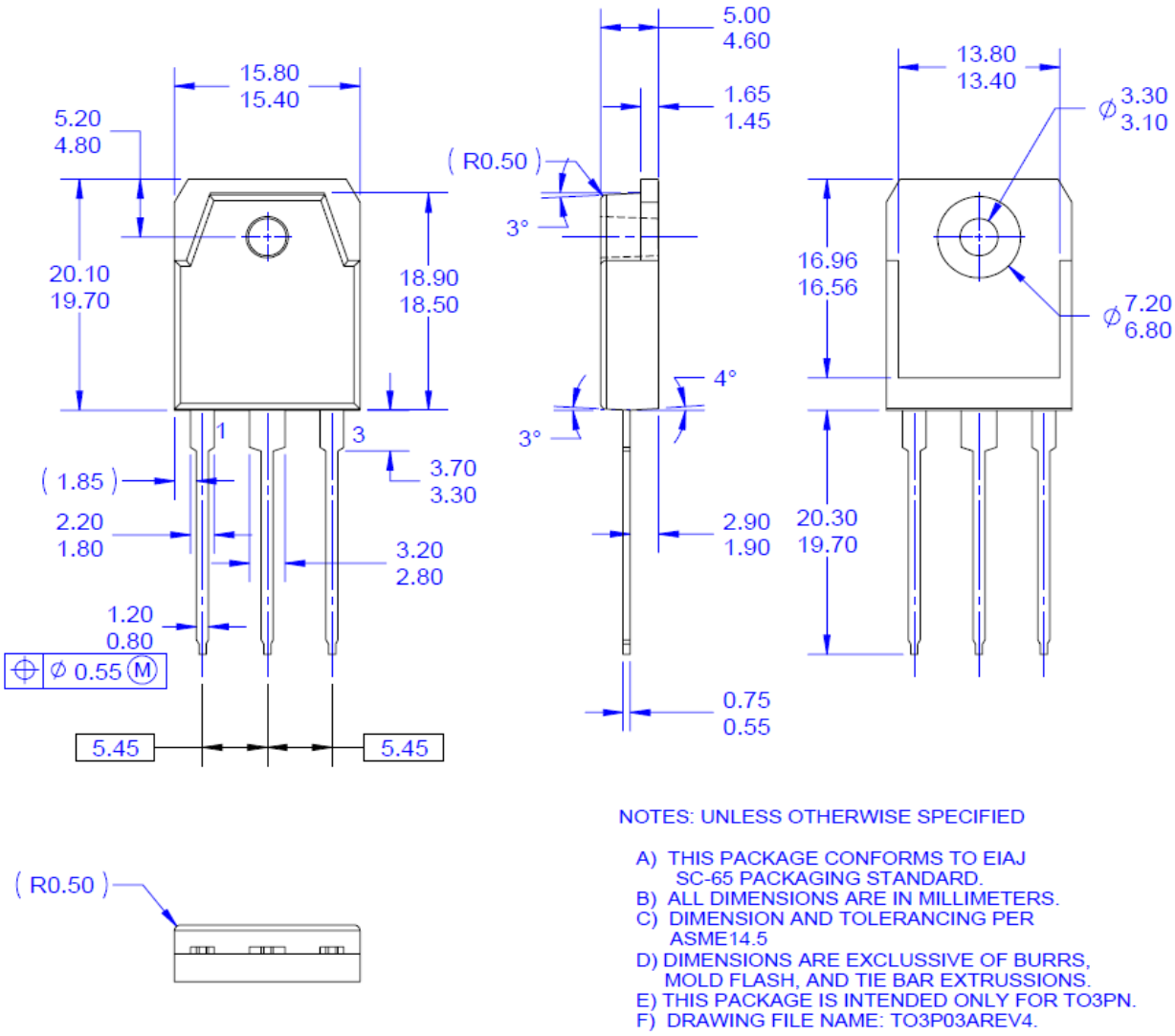


Figure 22. TO-3P 3L - 3LD, T03, PLASTIC, EIAJ SC-65

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