

FGA30S120P

Shorted Anode™ IGBT

Features

- High speed switching
- Low saturation voltage: $V_{CE(sat)} = 1.75V @ I_C = 30A$
- High input impedance
- RoHS compliant

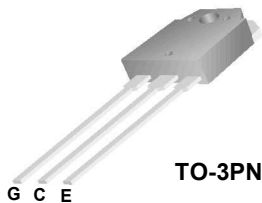
Applications

- Induction Heating and Microwave oven
- Soft switching Application

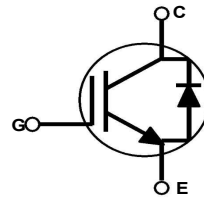


General Description

Using advanced Field Stop Trench and ShortedAnode technology, Fairchild's Shorted Anode™ Trench IGBTs offer superior conduction and switching performances, and easy parallel operation with exceptional avalanche capability. This device is designed for Induction Heating and Microwave Oven.



TO-3PN



Absolute Maximum Ratings $T_C = 25^\circ C$ unless otherwise noted

Symbol	Description	Ratings	Units
V_{CES}	Collector to Emitter Voltage	1300	V
V_{GES}	Gate to Emitter Voltage	± 25	V
I_C	Collector Current @ $T_C = 25^\circ C$	60	A
	Collector Current @ $T_C = 100^\circ C$	30	A
$I_{CM} (1)$	Pulsed Collector Current	150	A
I_F	Diode Continuous Forward Current @ $T_C = 25^\circ C$	60	A
I_F	Diode Continuous Forward Current @ $T_C = 100^\circ C$	30	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	500	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	250	W
T_J	Operating Junction Temperature	-55 to +175	$^\circ C$
T_{stg}	Storage Temperature Range	-55 to +175	$^\circ C$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	--	0.3	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ C/W$

Notes:
1: Limited by T_{jmax}

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGA30S120P	FGA30S120P	TO-3PN	-	-	30

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
I _{CES}	Collector Cut-Off Current	V _{CE} = 1300, V _{GE} = 0V	-	-	1	mA
I _{GES}	G-E Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0V	-	-	±500	nA
On Characteristics						
V _{GE(th)}	G-E Threshold Voltage	I _C = 30mA, V _{CE} = V _{GE}	4.5	6.0	7.5	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 30A, V _{GE} = 15V T _C = 25°C	-	1.75	2.3	V
		I _C = 30A, V _{GE} = 15V, T _C = 125°C	-	1.85	-	V
		I _C = 30A, V _{GE} = 15V, T _C = 175°C	-	1.9	-	V
V _{FM}	Diode Forward Voltage	I _F = 30A, T _C = 25°C	-	1.7	2.2	V
		I _F = 30A, T _C = 175°C	-	2.1	-	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 30V, V _{GE} = 0V, f = 1MHz	-	3345	4450	pF
C _{oes}	Output Capacitance		-	75	100	pF
C _{res}	Reverse Transfer Capacitance		-	60	90	pF
Switching Characcteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600V, I _C = 30A, R _G = 10Ω, V _{GE} = 15V, Resistive Load, T _C = 25°C	-	39	50	ns
t _r	Rise Time		-	360	465	ns
t _{d(off)}	Turn-Off Delay Time		-	620	805	ns
t _f	Fall Time		-	160	210	ns
E _{on}	Turn-On Switching Loss		-	1.3	1.7	mJ
E _{off}	Turn-Off Switching Loss		-	1.22	1.6	mJ
E _{ts}	Total Switching Loss		-	2.52	3.3	mJ
t _{d(on)}	Turn-On Delay Time	V _{CC} = 600V, I _C = 30A, R _G = 10Ω, V _{GE} = 15V, Resistive Load, T _C = 175°C	-	38	50	ns
t _r	Rise Time		-	375	490	ns
t _{d(off)}	Turn-Off Delay Time		-	635	825	ns
t _f	Fall Time		-	270	350	ns
E _{on}	Turn-On Switching Loss		-	1.59	2.05	mJ
E _{off}	Turn-Off Switching Loss		-	1.78	2.31	mJ
E _{ts}	Total Switching Loss		-	3.37	4.36	mJ
Q _g	Total Gate Charge	V _{CE} = 600V, I _C = 30A, V _{GE} = 15V	-	78	115	nC
Q _{ge}	Gate to Emitter Charge		-	4.2	6.3	nC
Q _{gc}	Gate to Collector Charge		-	33.3	50	nC

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

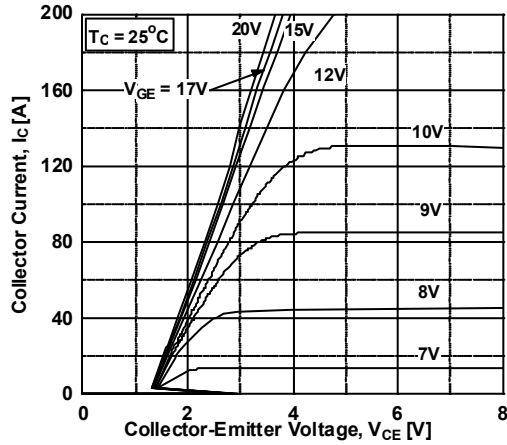


Figure 2. Typical Saturation Voltage Characteristics

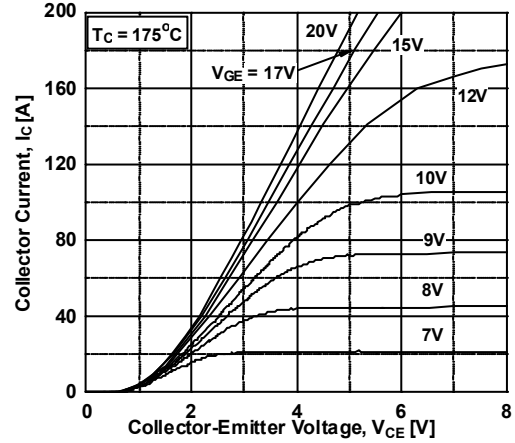


Figure 3. Typical Saturation Voltage Characteristics

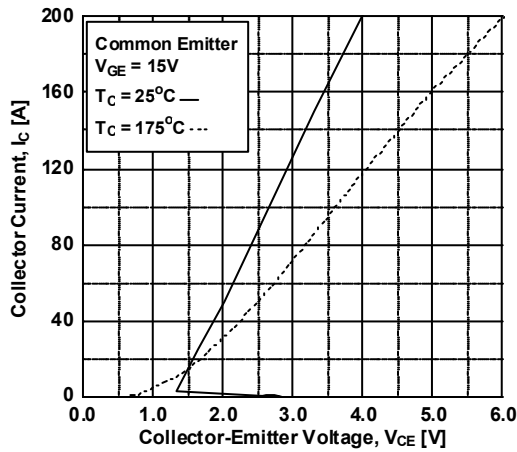


Figure 4. Transfer Characteristics

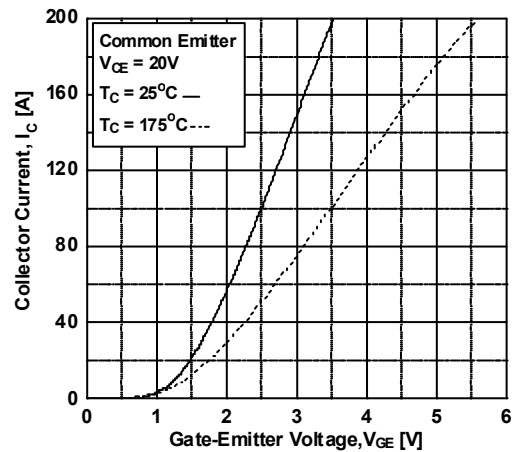


Figure 5. Saturation Voltage vs. Case

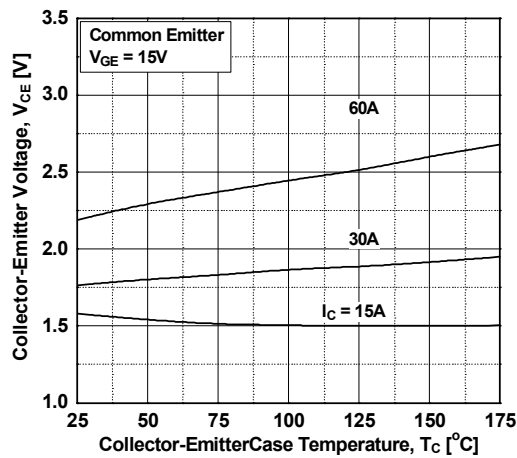
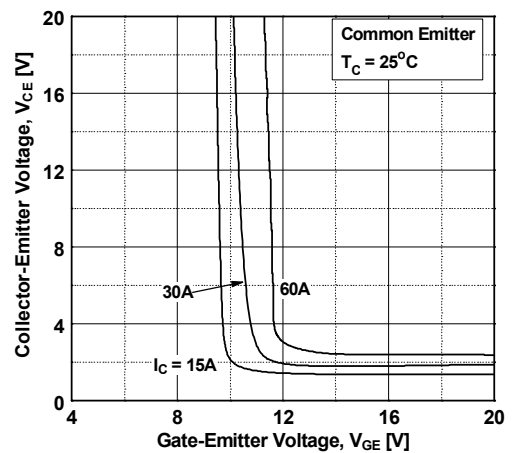


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

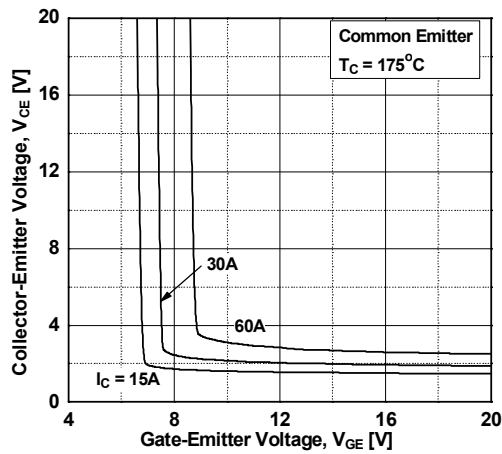


Figure 8. Capacitance Characteristics

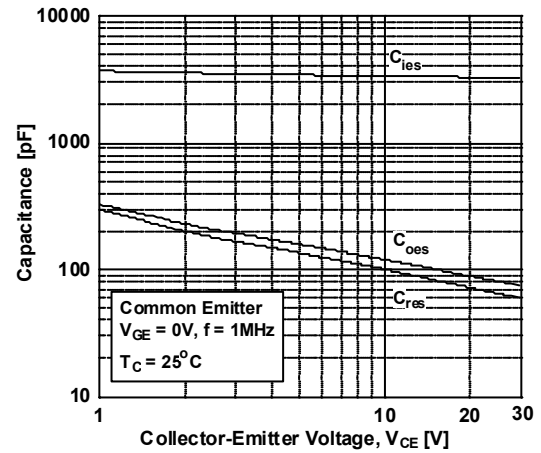


Figure 9. Gate Charge Characteristics

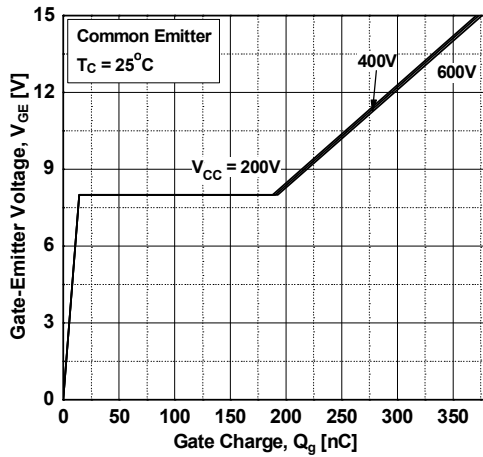


Figure 10. SOA Characteristics

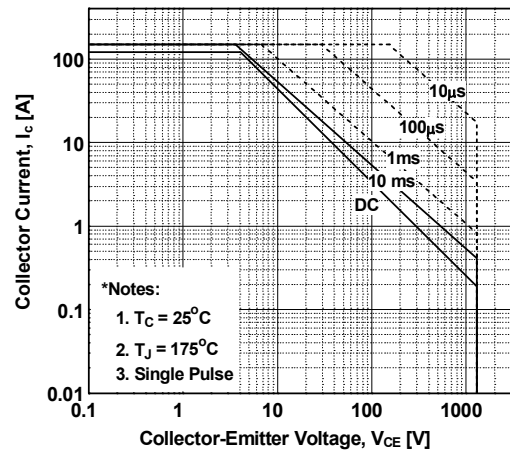


Figure 11. Turn-On Characteristics vs Gate Resistance

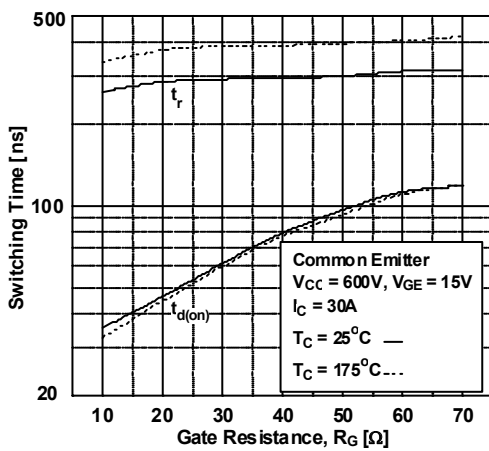
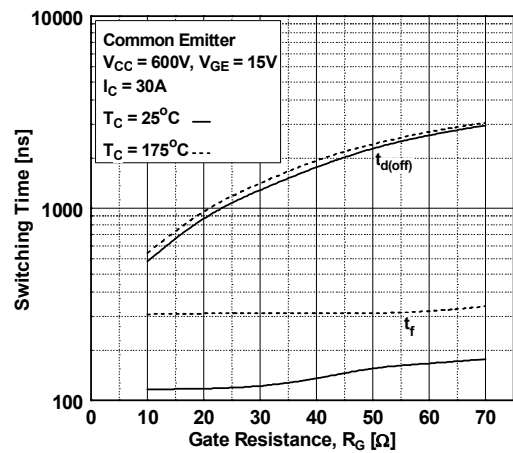


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics VS. Collector Current

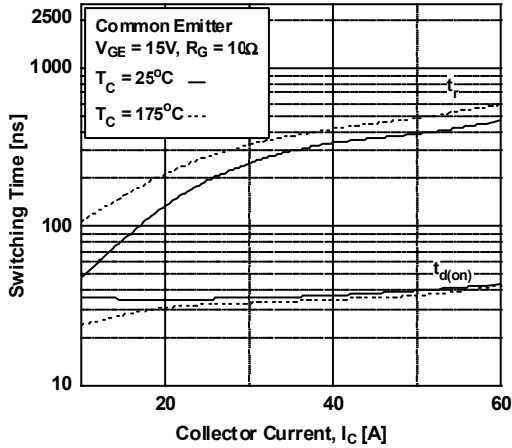


Figure 14. Turn-off Characteristics VS. Collector Current

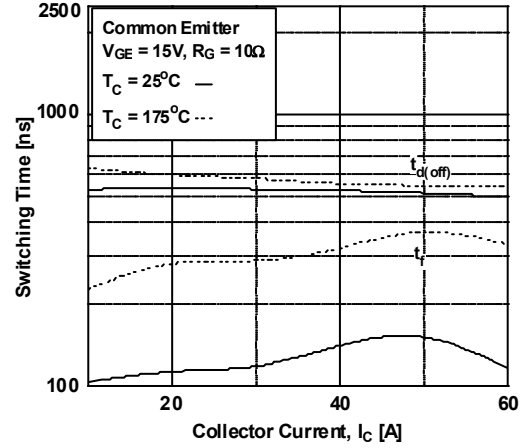


Figure 15. Switching Loss VS. Gate Resistance

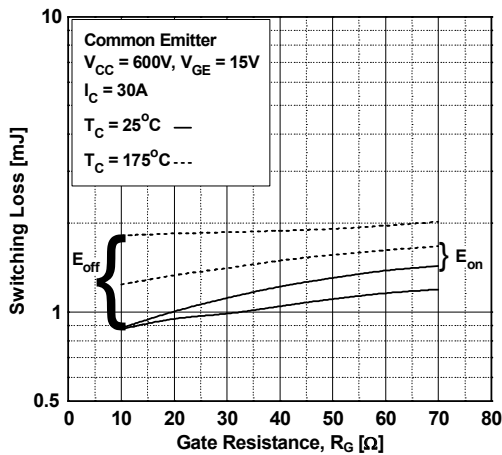


Figure 16. Switching Loss VS. Gate Resistance

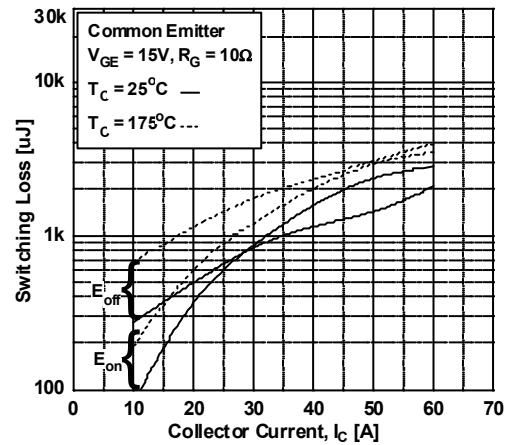


Figure 17. Turn off Switching SOA Characteristics

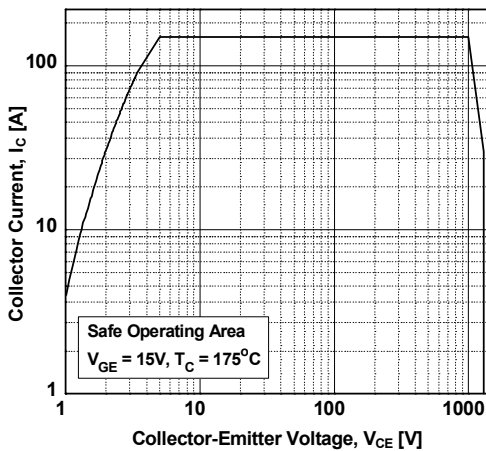


Figure 18. Forward Characteristics

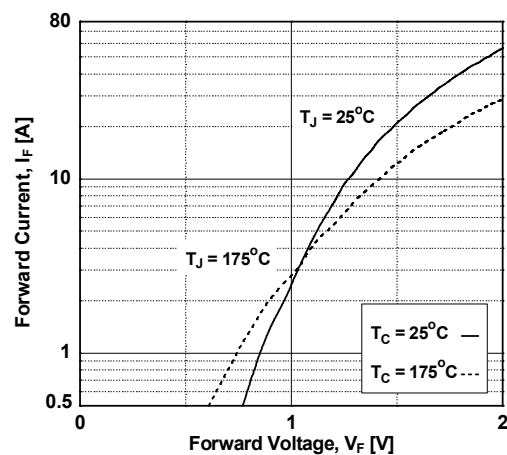
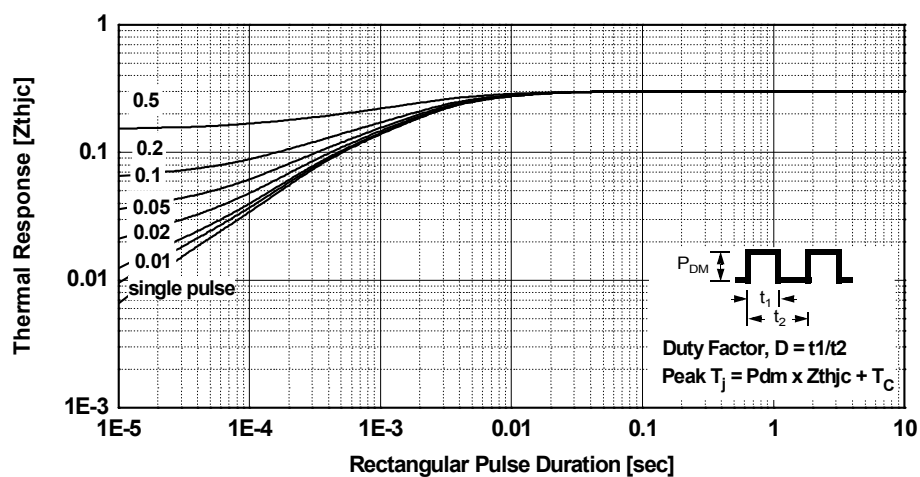
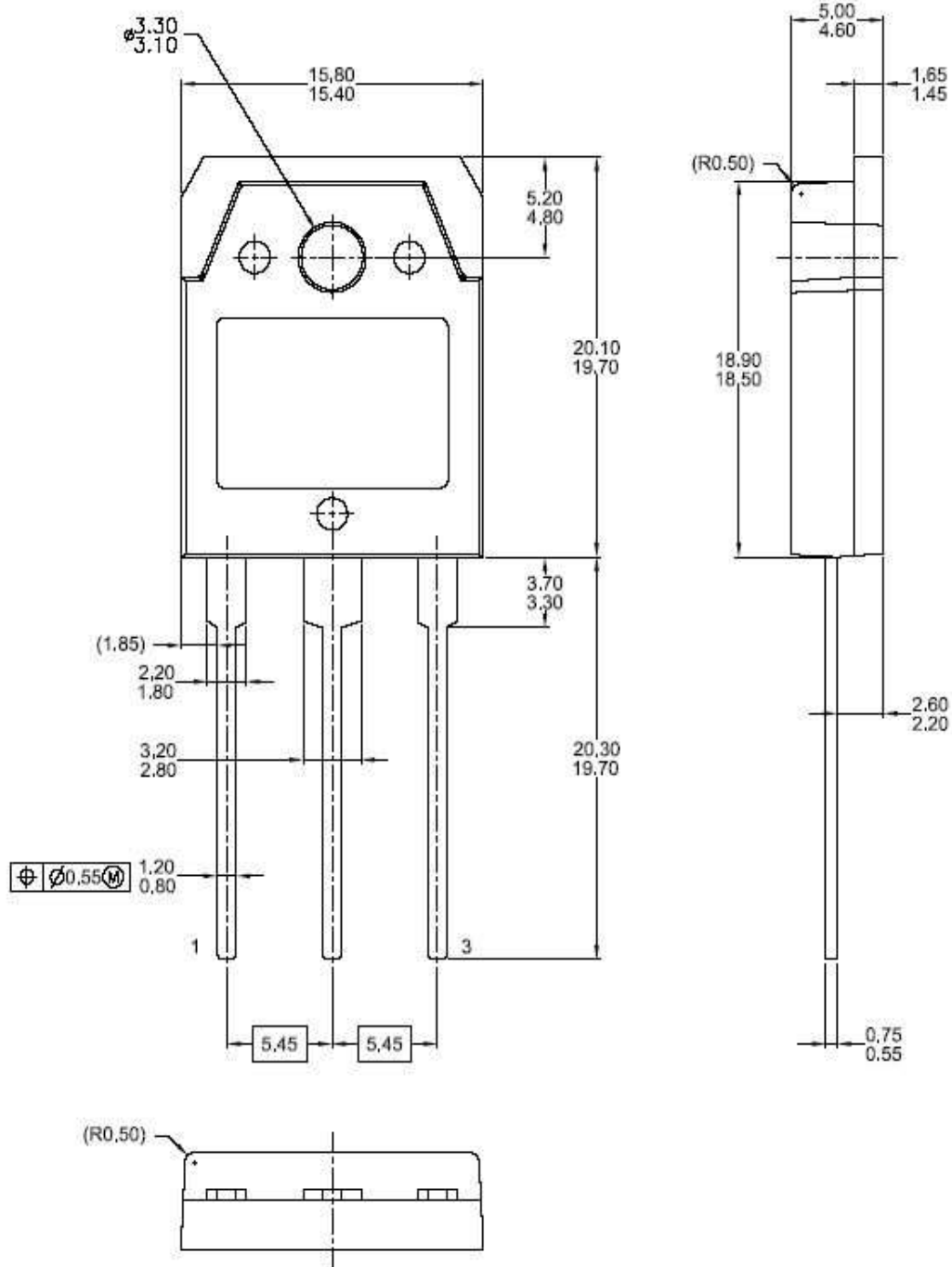


Figure 19. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3PN



Dimensions in Millimeters

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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.
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