

FGA180N33ATD

330V, 180A PDP Trench IGBT

Features

- High Current Capability
- Low saturation voltage: $V_{CE(sat)} = 1.03V$ @ $I_C = 40A$
- High input impedance
- RoHS compliant

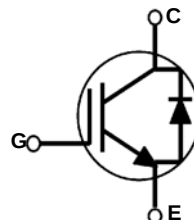
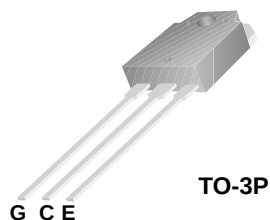
Applications

- PDP SYSTEM



General Description

Using Novel Trench IGBT Technology, Fairchild's new series of trench IGBTs offer the optimum performance for PDP applications where low conduction and switching losses are essential.



Absolute Maximum Ratings

Symbol	Description	Ratings	Units
V_{CES}	Collector to Emitter Voltage	330	V
V_{GES}	Gate to Emitter Voltage	± 30	V
I_C	Collector Current @ $T_C = 25^\circ C$	180	A
I_C pulse (1)	Pulsed Collector Current @ $T_C = 25^\circ C$	450	A
P_D	Maximum Power Dissipation @ $T_C = 25^\circ C$	390	W
	Maximum Power Dissipation @ $T_C = 100^\circ C$	156	W
T_J	Operating Junction Temperature	-55 to +150	$^\circ C$
T_{stg}	Storage Temperature Range	-55 to +150	$^\circ C$
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ C$

Notes:

1: Repetitive test, pulse width = 100usec, Duty = 0.1

* I_C pulse limited by max T_J

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	-	0.32	$^\circ C/W$
$R_{\theta JC}(Diode)$	Thermal Resistance, Junction to Case	-	0.82	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	$^\circ C/W$

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGA180N33ATD	FGA180N33ATDTU	TO-3P	Tube	30ea	-

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

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
BV _{CES}	Collector to Emitter Breakdown Voltage	V _{GE} = 0V, I _C = 400μA	330	-	-	V
I _{CES}	Collector Cut-Off Current	V _{CE} = V _{CES} , V _{GE} = 0V	-	-	400	μA
I _{GES}	G-E Leakage Current	V _{GE} = V _{GES} , V _{CE} = 0V	-	-	±400	nA
On Characteristics						
V _{GE(th)}	G-E Threshold Voltage	I _C = 250uA, V _{CE} = V _{GE}	2.5	4.0	5.5	V
V _{CE(sat)}	Collector to Emitter Saturation Voltage	I _C = 40A, V _{GE} = 15V	-	1.1	1.4	V
		I _C = 180A, V _{GE} = 15V,	-	1.68	-	V
		I _C = 180A, V _{GE} = 15V T _C = 125°C	-	1.89	-	V
Dynamic Characteristics						
C _{ies}	Input Capacitance	V _{CE} = 30V, V _{GE} = 0V, f = 1MHz	-	3880	-	pF
C _{oes}	Output Capacitance		-	305	-	pF
C _{res}	Reverse Transfer Capacitance		-	180	-	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{CC} = 200V, I _C = 40A, R _G = 5Ω, V _{GE} = 15V, Resistive Load, T _C = 25°C	-	27	-	ns
t _r	Rise Time		-	80	-	ns
t _{d(off)}	Turn-Off Delay Time		-	108	-	ns
t _f	Fall Time		-	180	240	ns
t _{d(on)}	Turn-On Delay Time	V _{CC} = 200V, I _C = 40A, R _G = 5Ω, V _{GE} = 15V, Resistive Load, T _C = 125°C	-	26	-	ns
t _r	Rise Time		-	75	-	ns
t _{d(off)}	Turn-Off Delay Time		-	112	-	ns
t _f	Fall Time		-	250	300	ns
Q _g	Total Gate Charge	V _{CE} = 200V, I _C = 40A, V _{GE} = 15V	-	169	-	nC
Q _{ge}	Gate to Emitter Charge		-	22	-	nC
Q _{gc}	Gate to Collector Charge		-	69	-	nC

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max	Units
V _{FM}	Diode Forward Voltage	I _F = 20A	T _C = 25°C	-	1.2	1.6	V
			T _C = 125°C	-	1.04	-	
t _{rr}	Diode Reverse Recovery Time	I _F = 20A di/dt = 200A/μs	T _C = 25°C	-	27	-	ns
			T _C = 125°C	-	39	-	
I _{rr}	Diode Peak Reverse Recovery Cyrrent		T _C = 25°C	-	3.5	-	A
			T _C = 125°C	-	6.0	-	
Q _{rr}	Diode Reverse Recovery Charge		T _C = 25°C	-	48	-	μC
			T _C = 125°C	-	117	-	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

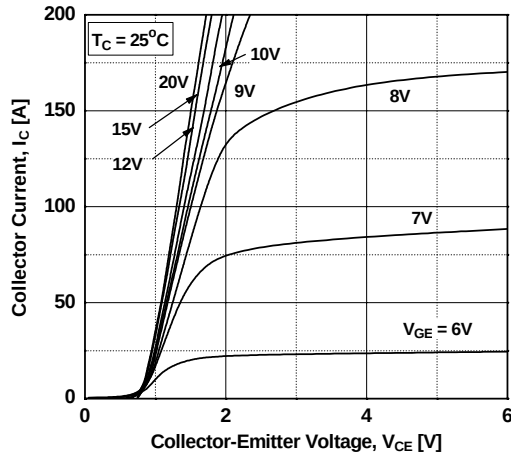


Figure 2. Typical Output Characteristics

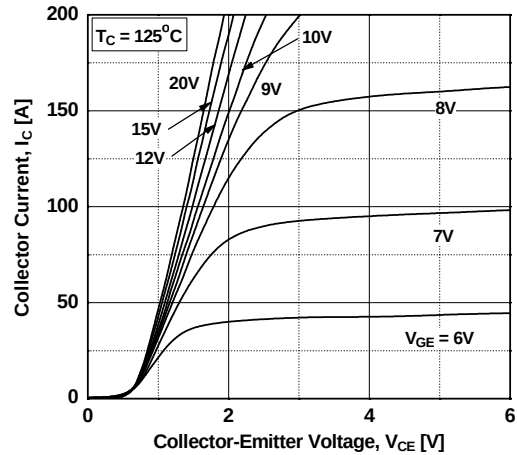


Figure 3. Typical Saturation Voltage Characteristics

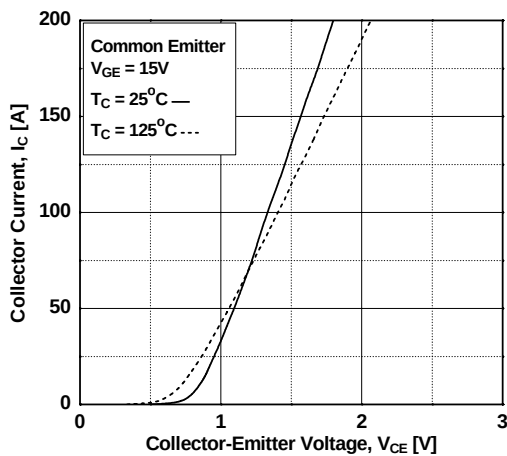


Figure 4. Transfer Characteristics

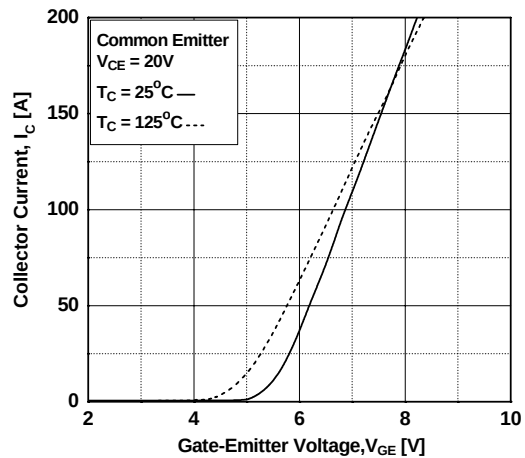


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

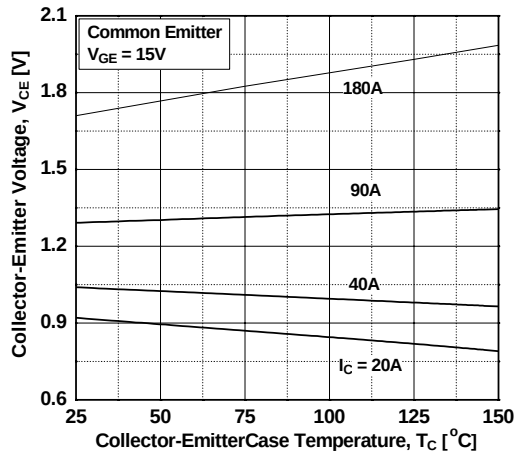
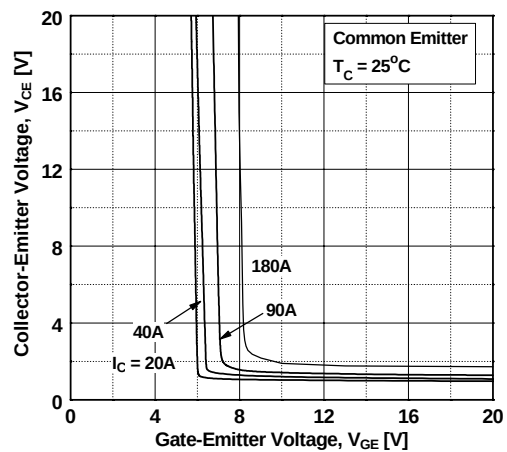


Figure 6. Saturation Voltage vs. V_GE



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

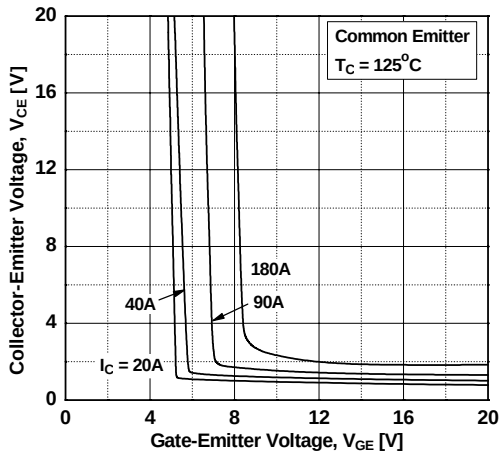


Figure 8. Capacitance Characteristics

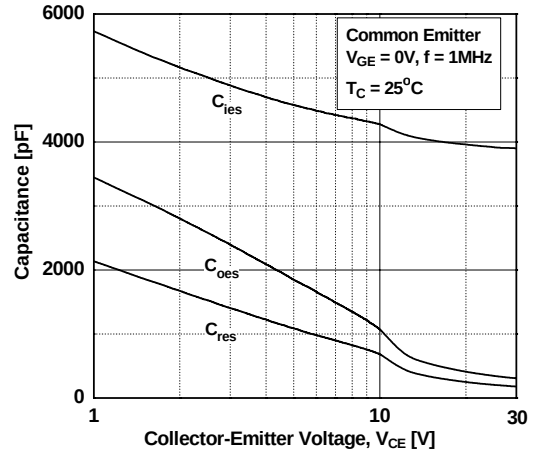


Figure 9. Gate charge Characteristics

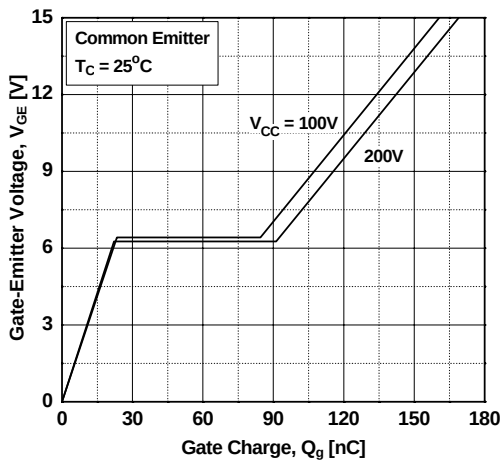


Figure 10. SOA Characteristics

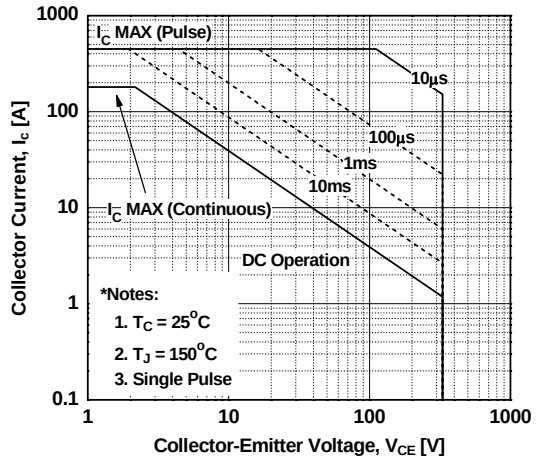


Figure 11. Turn-on Characteristics vs. Gate Resistance

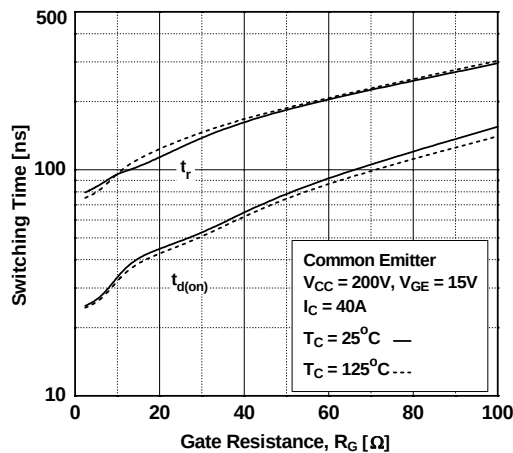
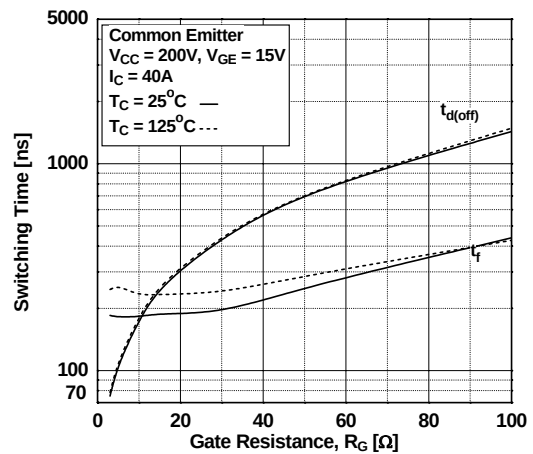


Figure 12. Turn-off Characteristics vs. Gate Resistance



Typical Performance Characteristics

Figure 13. Turn-on Characteristics vs. Collector Current

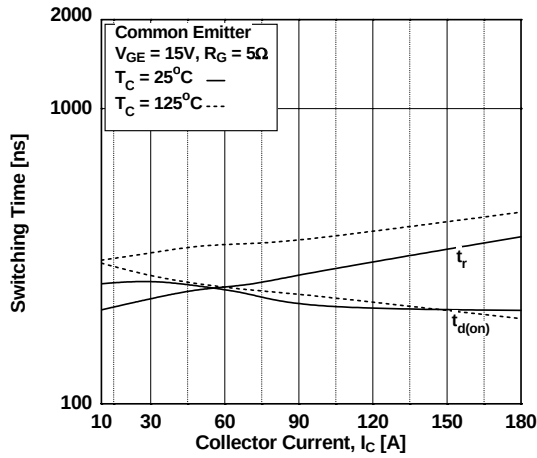


Figure 14. Turn-off Characteristics vs. Collector Current

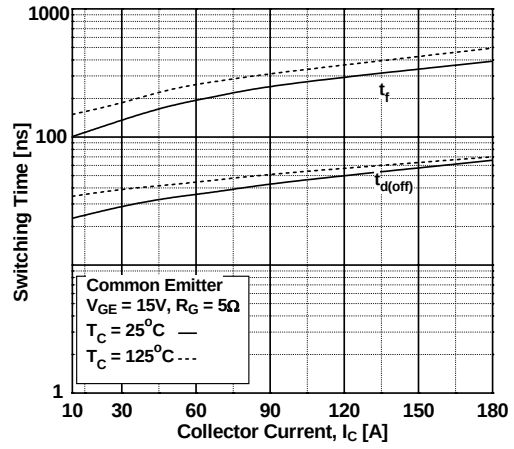


Figure 15. Turn off Switching SOA Characteristics

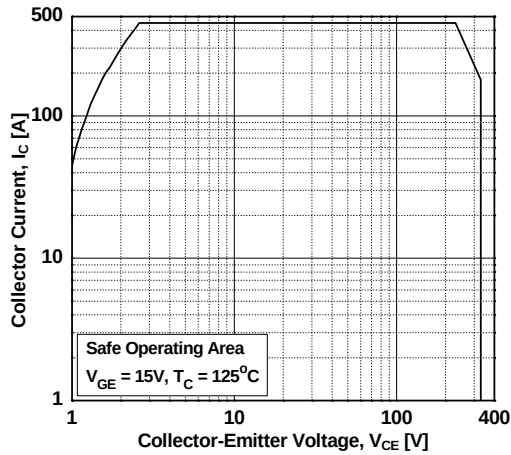
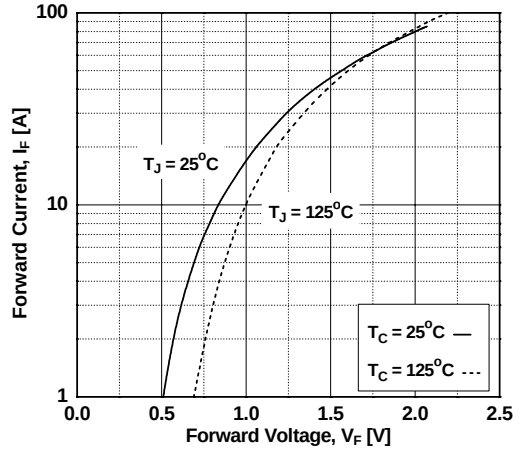


Figure 16. Forward Characteristics



Typical Performance Characteristics

Figure 17. Reverse Recovery Current

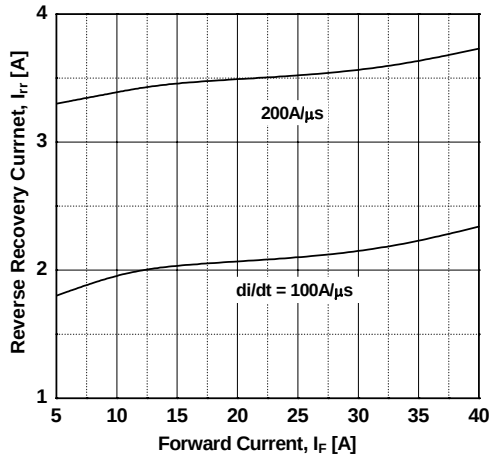


Figure 18. Stored Charge

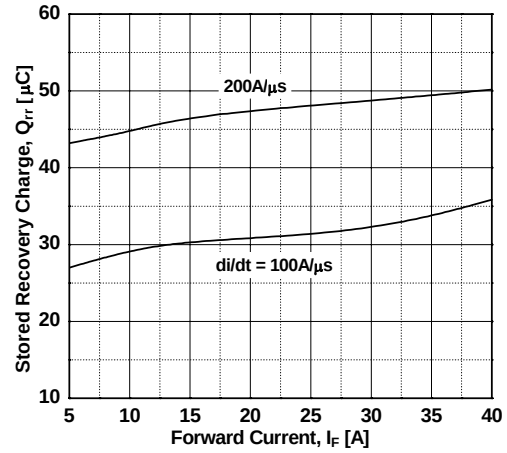


Figure 19. Reverse Recovery Time

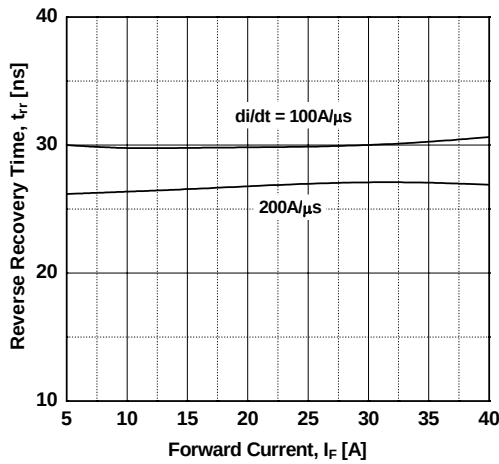
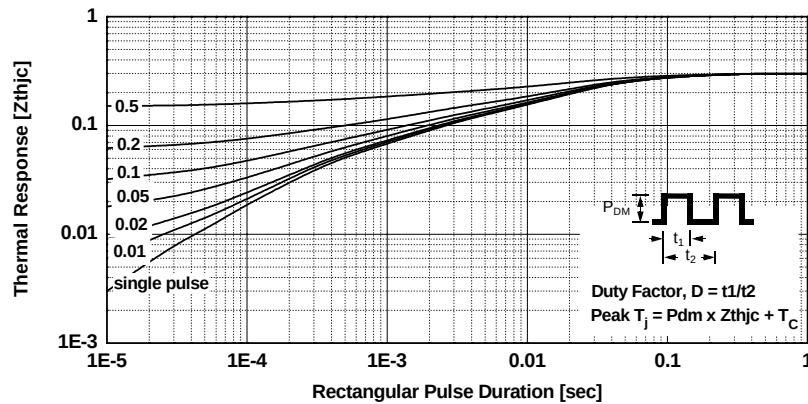
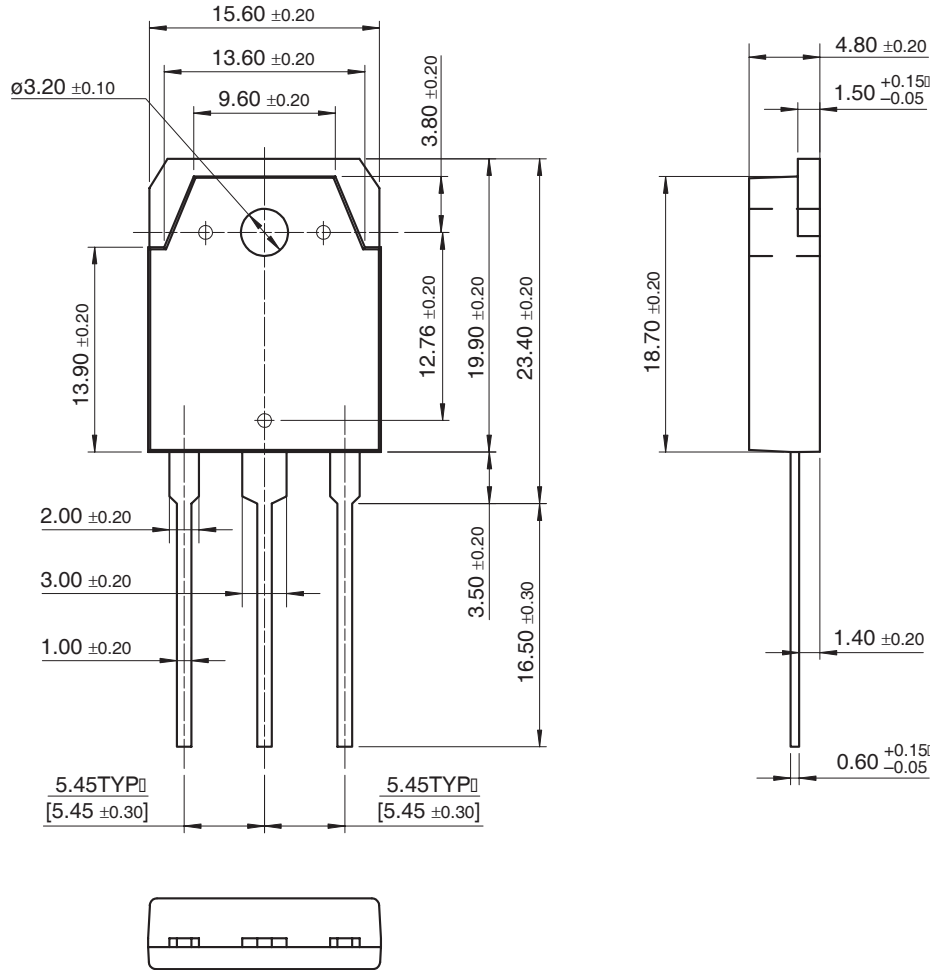


Figure 20. Transient Thermal Impedance of IGBT



Mechanical Dimensions

TO-3P



Dimensions in Millimeters



TRADEMARKS

The following includes registered and unregistered trademarks and service marks, owned by Fairchild Semiconductor and/or its global subsidiaries, and is not intended to be an exhaustive list of all such trademarks.

ACE [®]	FPS [™]	PDP-SPM [™]	The Power Franchise [®]
Build it Now [™]	F-PFS [™]	Power-SPM [™]	the power franchise
CorePLUS [™]	FRFET [®]	PowerTrench [®]	TinyBoost [™]
CorePOWER [™]	Global Power Resource SM	Programmable Active Droop [™]	TinyBuck [™]
CROSSVOLT [™]	Green FPS [™]	QFET [®]	TinyLogic [®]
CTL [™]	Green FPS [™] e-Series [™]	QS [™]	TINYOPTO [™]
Current Transfer Logic [™]	GTO [™]	Quiet Series [™]	TinyPower [™]
EcoSPARK [®]	IntelliMAX [™]	RapidConfigure [™]	TinyPWM [™]
EfficientMax [™]	ISOPLANAR [™]	Saving our world 1mW at a time [™]	TinyWire [™]
EZSWITCH [™] *	MegaBuck [™]	SmartMax [™]	μSerDes [™]
	MICROCOUPLER [™]	SMART START [™]	
	MicroFET [™]	SPM [®]	UHC [®]
Fairchild [®]	MicroPak [™]	STEALTH [™]	Ultra FRFET [™]
Fairchild Semiconductor [®]	MillerDrive [™]	SuperFET [™]	UniFET [™]
FACT Quiet Series [™]	MotionMax [™]	SuperSOT [™] -3	VCX [™]
FACT [®]	Motion-SPM [™]	SuperSOT [™] -6	VisualMax [™]
FAST [®]	OPTOLOGIC [®]	SuperSOT [™] -8	
FastvCore [™]	OPTOPLANAR [®]	SuperMOS [™]	
FlashWriter [®] *			

* EZSWITCH[™] and FlashWriter[®] are trademarks of System General Corporation, used under license by Fairchild Semiconductor.

DISCLAIMER

FAIRCHILD SEMICONDUCTOR RESERVES THE RIGHT TO MAKE CHANGES WITHOUT FURTHER NOTICE TO ANY PRODUCTS HEREIN TO IMPROVE RELIABILITY, FUNCTION, OR DESIGN. FAIRCHILD DOES NOT ASSUME ANY LIABILITY ARISING OUT OF THE APPLICATION OR USE OF ANY PRODUCT OR CIRCUIT DESCRIBED HEREIN; NEITHER DOES IT CONVEY ANY LICENSE UNDER ITS PATENT RIGHTS, NOR THE RIGHTS OF OTHERS. THESE SPECIFICATIONS DO NOT EXPAND THE TERMS OF FAIRCHILD'S WORLDWIDE TERMS AND CONDITIONS, SPECIFICALLY THE WARRANTY THEREIN, WHICH COVERS THESE PRODUCTS.

LIFE SUPPORT POLICY

FAIRCHILD'S PRODUCTS ARE NOT AUTHORIZED FOR USE AS CRITICAL COMPONENTS IN LIFE SUPPORT DEVICES OR SYSTEMS WITHOUT THE EXPRESS WRITTEN APPROVAL OF FAIRCHILD SEMICONDUCTOR CORPORATION.

As used herein:

1. Life support devices or systems are devices or systems which, (a) are intended for surgical implant into the body or (b) support or sustain life, and (c) whose failure to perform when properly used in accordance with instructions for use provided in the labeling, can be reasonably expected to result in a significant injury of the user.
2. A critical component in any component of a life support, device, or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

PRODUCT STATUS DEFINITIONS

Definition of Terms

Datasheet Identification	Product Status	Definition
Advance Information	Formative or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This 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	This 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	This datasheet contains specifications on a product that is discontinued by Fairchild Semiconductor. The datasheet is for reference information only.

Rev. 134