FAIRCHILD SEMICONDUCTOR®

March 2013

FGH50T65UPD

650V, 50A Field Stop Trench IGBT

Features

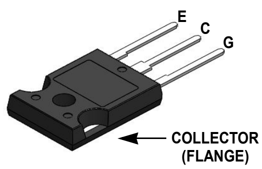
- Maximum Junction Temperature : $T_J = 175^oC$
- Positive Temperaure Co-efficient for easy parallel operating
- High current capability
- Low saturation voltage: $V_{CE(sat)} = 1.65V$(Typ.) @ $I_C = 50A$
- 100% of parts tested $I_{LM(2)}$
- High input impedance
- Tightened Parameter Distribution
- RoHS compliant
- Short Circuit Ruggedness > 5us @25^{o}C

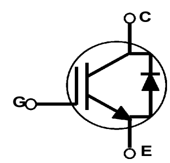
General Description

Using Novel Field Stop Trench IGBT Technology, Fairchild's new series of Field Stop Trench IGBTs offer the optimum performance for Solar Inverter , UPS, Induction Heating and Digital Power Generator where low conduction and switching losses are essential.

Applications

- Solar Inverter, UPS, Induction Heating, Digital Power Generator





Absolute Maximum Ratings

Symbol	Description		Ratings	Units
V_{CES}	Collector to Emitter Voltage		650	V
V_{GES}	Gate to Emitter Voltage		± 25	V
I_C	Collector Current	@ $T_C = 25^oC$	100	A
	Collector Current	@ $T_C = 100^oC$	50	A
$I_{CM\ (1)}$	Pulsed Collector Current		150	A
$I_{LM\ (2)}$	Clamped Inductive Load Current	@ $T_C = 25^oC$	150	A
I_F	Diode Forward Current	@ $T_C = 25^oC$	60	A
	Diode Forward Current	@ $T_C = 100^oC$	30	A
$I_{FM(1)}$	Pulsed Diode Maximum Forward Current		150	A
P_D	Maximum Power Dissipation	@ $T_C = 25^oC$	340	W
	Maximum Power Dissipation	@ $T_C = 100^oC$	170	W
SCWT	Short Circuit Withstand Time	@ $T_C = 25^oC$	5	us
T_J	Operating Junction Temperature		-55 to +175	^{o}C
T_{stg}	Storage Temperature Range		-55 to +175	^{o}C
T_L	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds		300	^{o}C

Notes:
1: Repetitive rating: Pulse width limited by max. junction temperature
2: Ic = 150A, Vce = 400V, Rg = 10Ω

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction to Case	-	0.44	^{o}C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction to Case	-	1.2	^{o}C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	-	40	^{o}C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Eco Status	Packing Type	Qty per Tube
FGH50T65UPD	FGH50T65UPD	TO-247	-	-	30ea

For Fairchild's definition of "green" Eco Status, please visit: http://www.fairchildsemi.com/company/green/rohs_green.html.

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 = 1mA	650	-	-	V
$\frac{\Delta BV_{CES}}{\Delta T_J}$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 1mA	-	0.6	-	V/°C
I_{CES}	Collector Cut-Off Current	$V_{CE} = V_{CES}$, V_{GE} = 0V	-	-	250	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 = 50mA, $V_{CE} = V_{GE}$	4.0	6.0	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 50A, V_{GE} = 15V	-	1.65	2.3	V
		I_C = 50A, V_{GE} = 15V, T_C = 175°C	-	2.1	-	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	-	3540	4710	pF
C_{oes}	Output Capacitance		-	110	146	pF
C_{res}	Reverse Transfer Capacitance		-	60	90	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 400V, I_C = 50A, R_G = 6.0Ω, V_{GE} = 15V, Inductive Load, T_C = 25°C	-	32	41	ns
t_r	Rise Time		-	59	77	ns
$t_{d(off)}$	Turn-Off Delay Time		-	160	208	ns
t_f	Fall Time		-	22	29	ns
E_{on}	Turn-On Switching Loss		-	2.7	3.5	mJ
E_{off}	Turn-Off Switching Loss		-	0.74	0.96	mJ
E_{ts}	Total Switching Loss		-	3.44	4.46	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 400V, I_C = 50A, R_G = 6.0Ω, V_{GE} = 15V, Inductive Load, T_C = 175°C	-	29	-	ns
t_r	Rise Time		-	72	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	166	-	ns
t_f	Fall Time		-	19	-	ns
E_{on}	Turn-On Switching Loss		-	3.5	-	mJ
E_{off}	Turn-Off Switching Loss		-	1.2	-	mJ
E_{ts}	Total Switching Loss		-	4.7	-	mJ
T_{SC}	Short Circuit Withstand Time	V_{GE} = 15V, V_{CC} =400V, R_G = 10Ω	5	-	-	us

Electrical Characteristics of the IGBT (Continued)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max	Units
Q_g	Total Gate Charge	V_{CE} = 400V, I_C = 50A, V_{GE} = 15V	-	230	345	nC
Q_{ge}	Gate to Emitter Charge		-	31	47	nC
Q_{gc}	Gate to Collector Charge		-	130	195	nC

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max	Units
V_{FM}	Diode Forward Voltage	I_F = 30A	T_C = 25^{o}C	-	2.1	2.7	V
			T_C = 175^{o}C	-	1.78	-	
E_{rec}	Reverse Recovery Energy	I_F = 30A, dI_F/dt = 200A/µs	T_C = 175^{o}C	-	46	-	uJ
t_{rr}	Diode Reverse Recovery Time		T_C = 25^{o}C	-	41	53	ns
			T_C = 175^{o}C	-	144	-	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25^{o}C	-	76	106	nC
			T_C = 175^{o}C	-	486	-	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

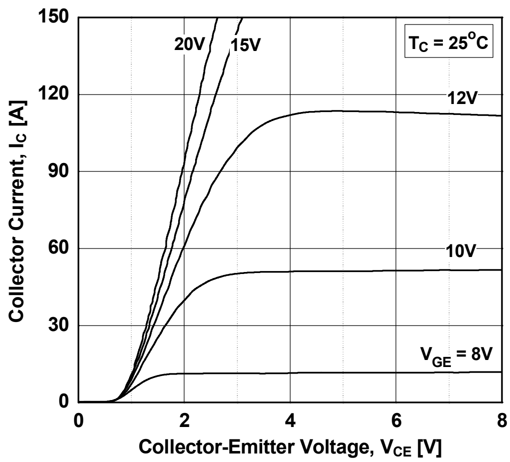


Figure 2. Typical Output Characteristics

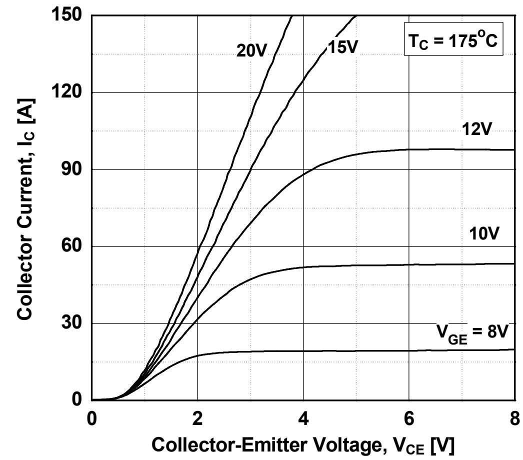


Figure 3. Typical Saturation Voltage Characteristics

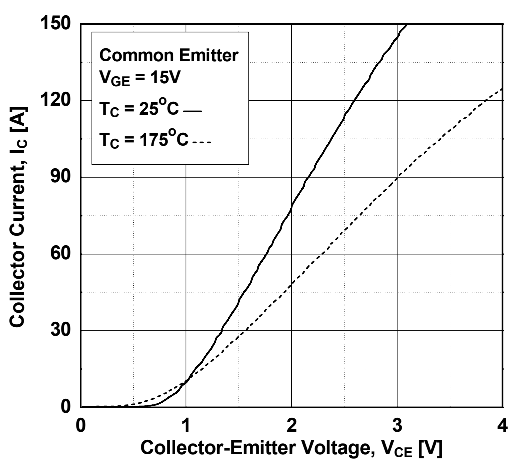


Figure 4. Transfer Characteristics

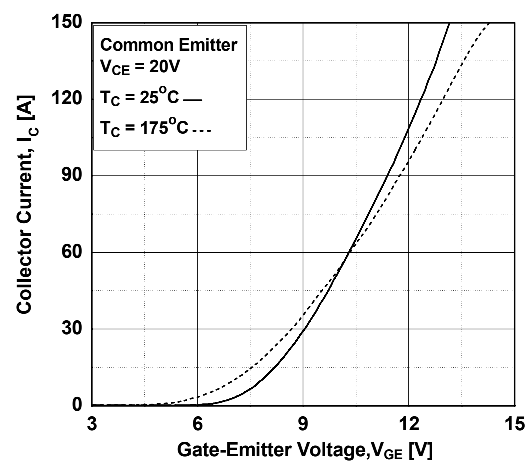


Figure 5. Saturation Voltage vs. Case Temperature at Variant Current Level

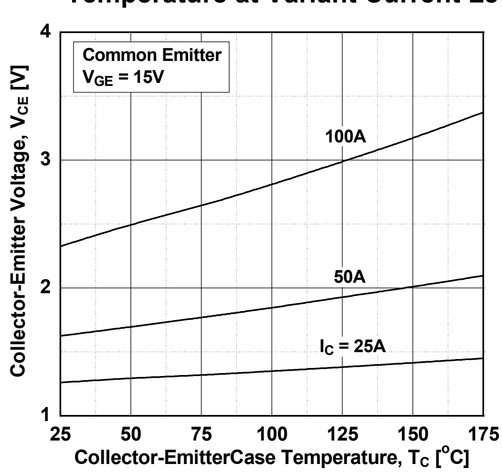
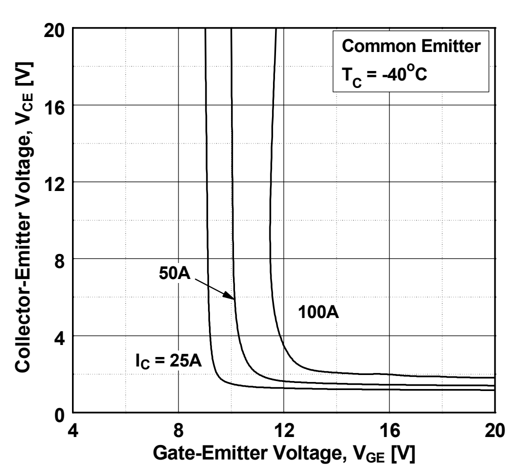


Figure 6. Saturation Voltage vs. V_{GE}



Typical Performance Characteristics

Figure 7. Saturation Voltage vs. V_{GE}

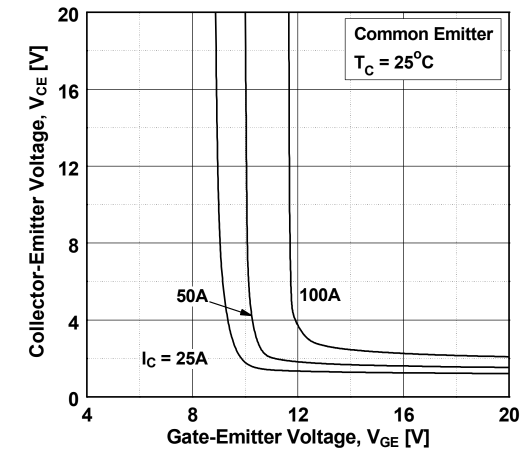


Figure 8. Saturation Voltage vs. V_{GE}

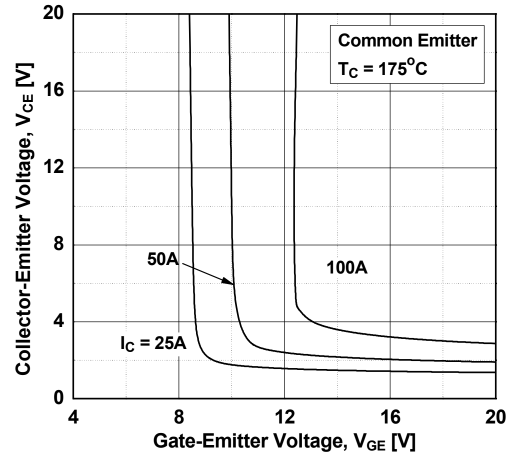


Figure 9. Capacitance Characteristics

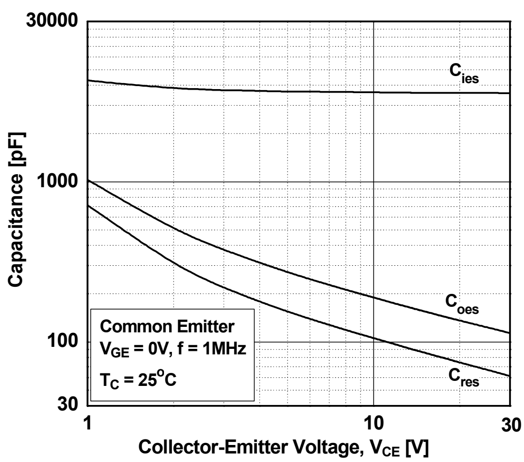


Figure 10. Gate charge Characteristics

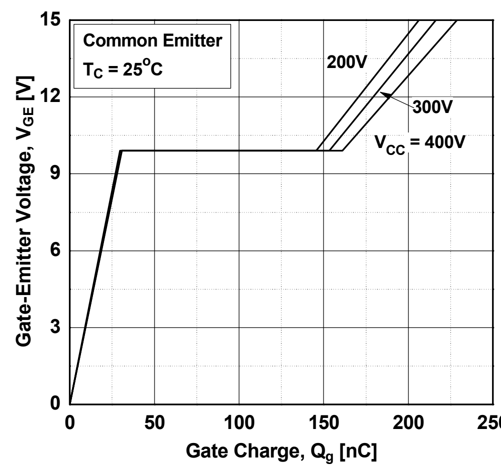


Figure 11. SOA Characteristics

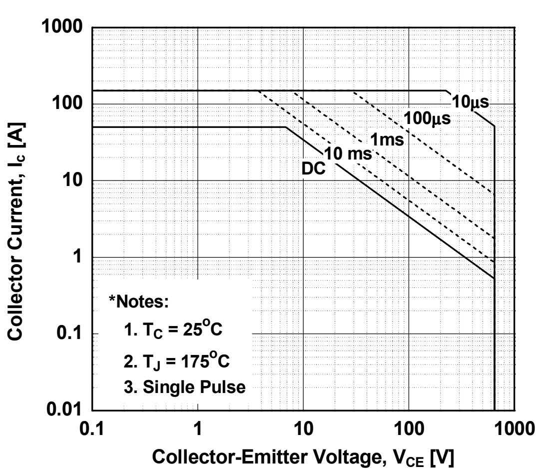
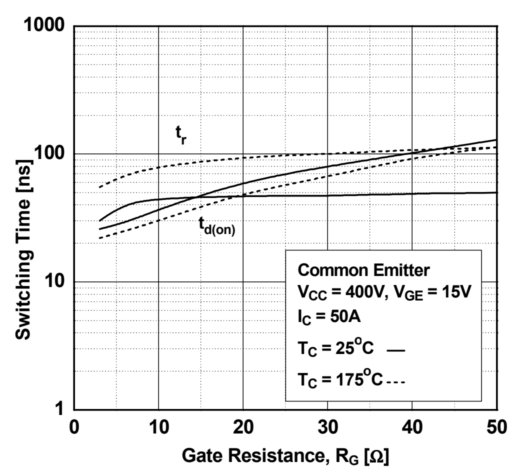


Figure 12. Turn-on Characteristics vs. Gate Resistance



Typical Performance Characteristics

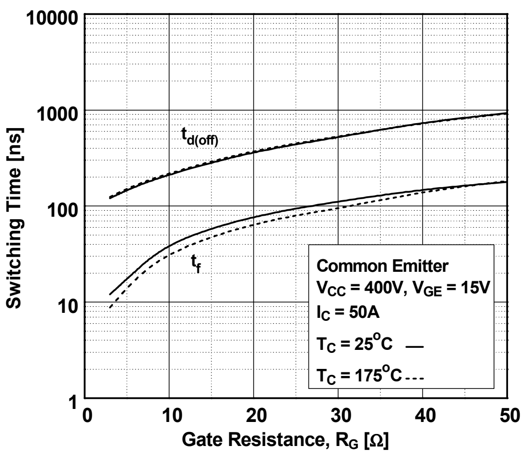


Figure 13. Turn-off Characteristics vs. Gate Resistance

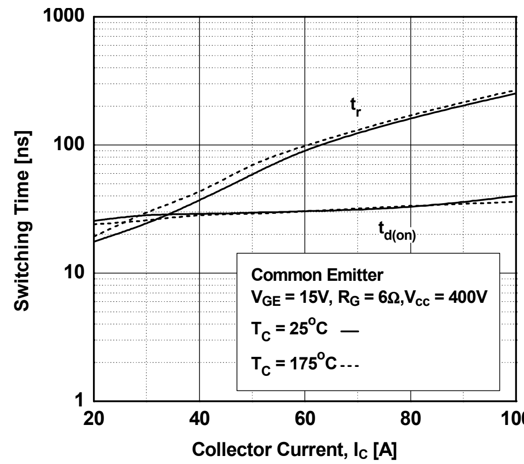


Figure 14. Turn-on Characteristics vs. Collector Current

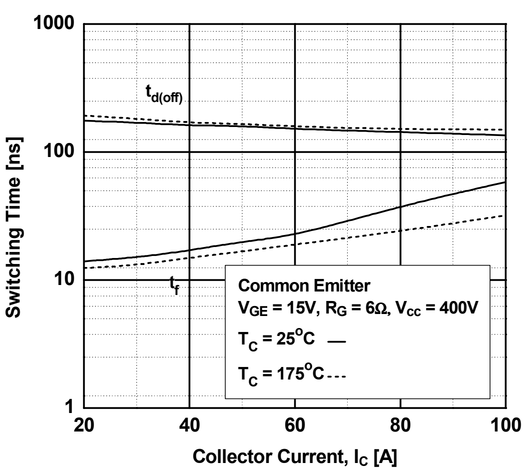


Figure 15. Turn-off Characteristics vs. Collector Current

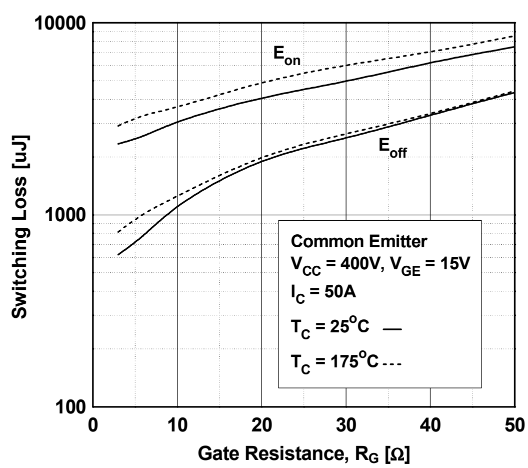


Figure 16. Switching Loss vs. Gate Resistance

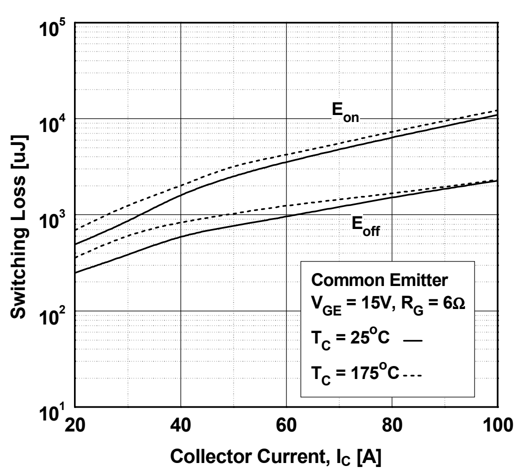


Figure 17. Switching Loss vs. Collector Current

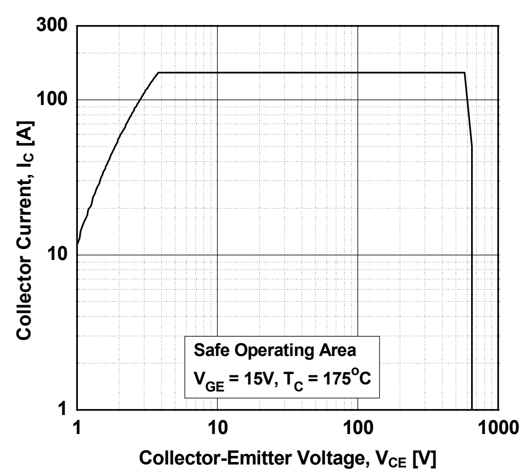


Figure 18. Turn off Switching SOA Characteristics

Typical Performance Characteristics

Figure 19. Current Derating

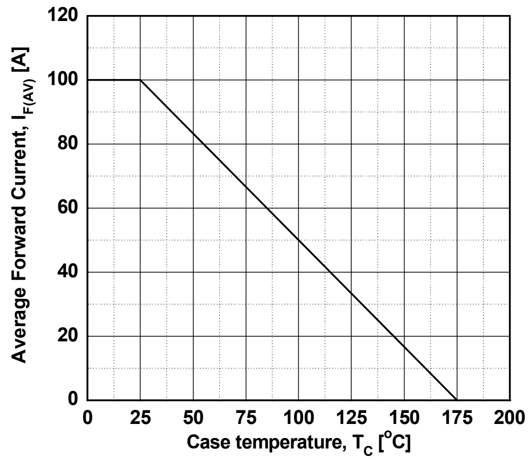


Figure 20. Load Current Vs. Frequence

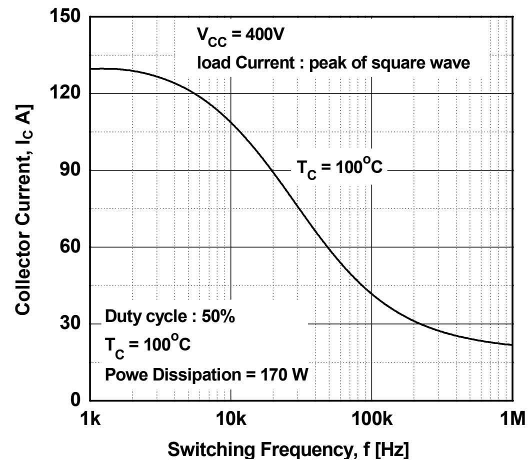


Figure 21. Forward Characteristics

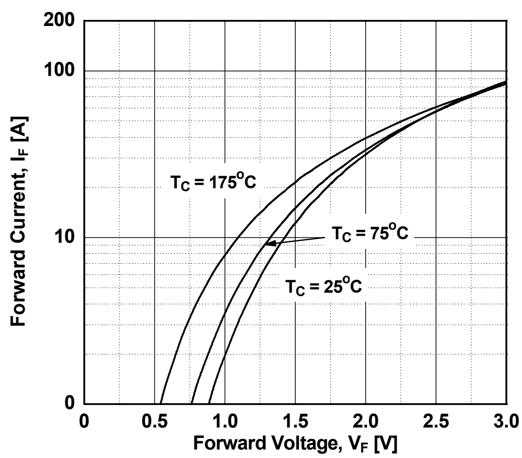


Figure 22. Reverse Recovery Current

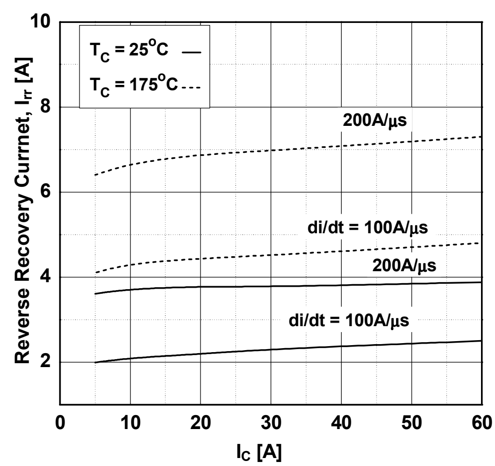


Figure 23. Stored Charge

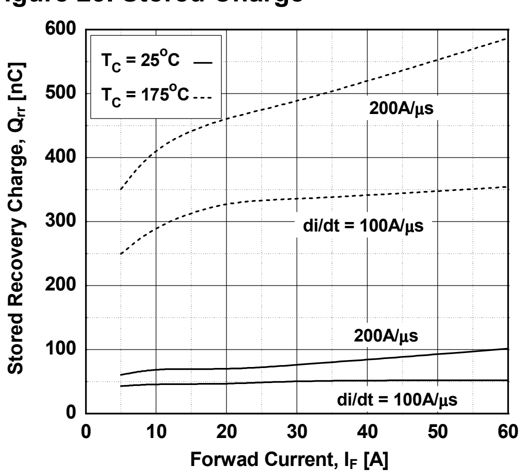
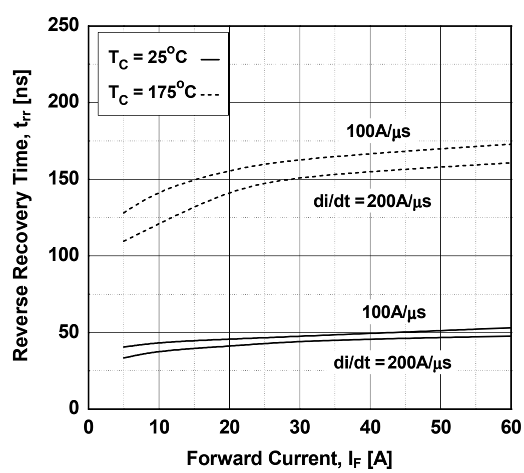


Figure 24. Reverse Recovery Time



Typical Performance Characteristics

Figure 25. Transient Thermal Impedance of IGBT

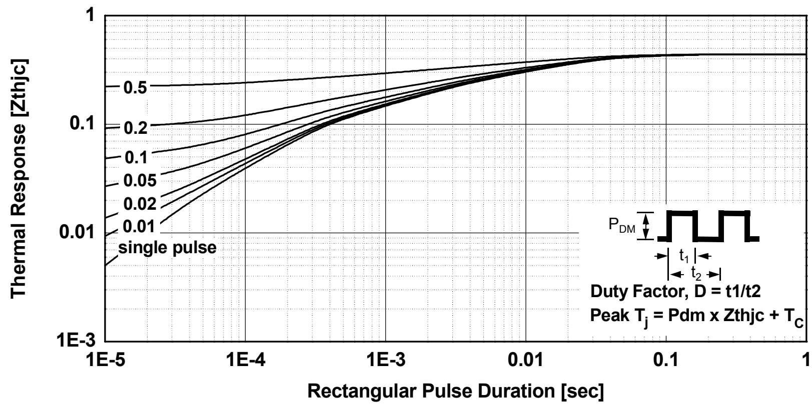
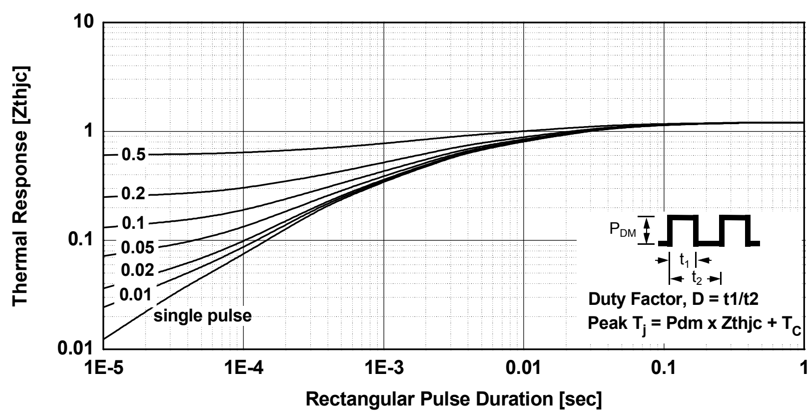
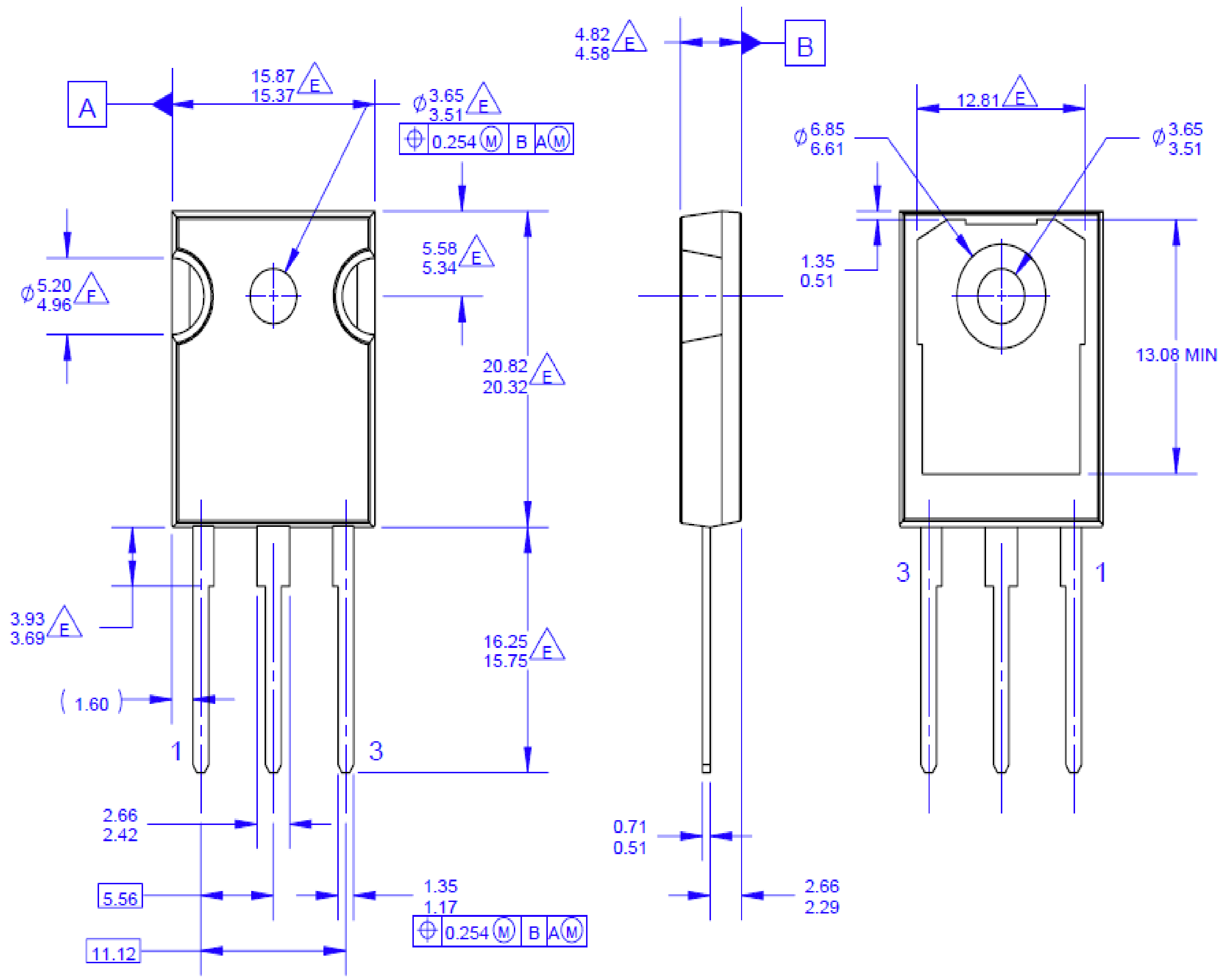


Figure 26.Transient Thermal Impedance of Diode



Mechanical Dimensions

TO - 247AB (FKS PKG CODE 001)



NOTES: UNLESS OTHERWISE SPECIFIED.

A. PACKAGE REFERENCE: JEDEC TO-247, ISSUE E, VARIATION AB, DATED JUNE, 2004.
B. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DRAWING CONFORMS TO ASME Y14.5 - 1994

E. DOES NOT COMPLY JEDEC STANDARD VALUE

F. NOTCH MAY BE SQUARE

G. DRAWING FILENAME: MKT-TO247A03_REV03

FAIRCHILD SEMICONDUCTOR®

PRODUCT STATUS DEFINITIONS

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. I61

Стандарт
Электрон
Связь

Мы молодая и активно развивающаяся компания в области поставок электронных компонентов. Мы поставляем электронные компоненты отечественного и импортного производства напрямую от производителей и с крупнейших складов мира.

Благодаря сотрудничеству с мировыми поставщиками мы осуществляем комплексные и плановые поставки широчайшего спектра электронных компонентов.

Собственная эффективная логистика и склад в обеспечивает надежную поставку продукции в точно указанные сроки по всей России.

Мы осуществляем техническую поддержку нашим клиентам и предпродажную проверку качества продукции. На все поставляемые продукты мы предоставляем гарантию .

Осуществляем поставки продукции под контролем ВП МО РФ на предприятия военно-промышленного комплекса России , а также работаем в рамках 275 ФЗ с открытием отдельных счетов в уполномоченном банке. Система менеджмента качества компании соответствует требованиям ГОСТ ISO 9001.

Минимальные сроки поставки, гибкие цены, неограниченный ассортимент и индивидуальный подход к клиентам являются основой для выстраивания долгосрочного и эффективного сотрудничества с предприятиями радиоэлектронной промышленности, предприятиями ВПК и научно-исследовательскими институтами России.

С нами вы становитесь еще успешнее!

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Электронная почта: sales@st-electron.ru

Адрес: 198099, Санкт-Петербург, Промышленная ул, дом № 19, литера Н, помещение 100-Н Офис 331