FAIRCHILD SEMICONDUCTOR®

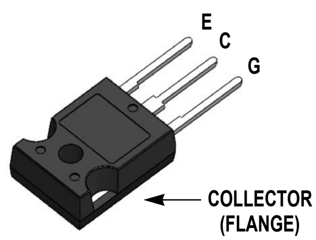
March 2013

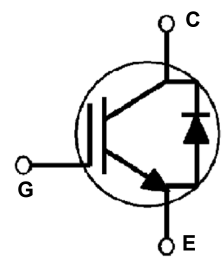
FGH80N60FD
600 V Field Stop IGBT

Features
- High Current Capability
- Low Saturation Voltage: $V_{CE(sat)}$ = 1.8 V @ I_C = 40 A
- High Input Impedance
- Fast Switching
- RoHS Complaint

Applications
- Induction Heating, PFC, Telecom, ESS

General Description
Using novel field stop IGBT technology, Fairchild®'s field stop IGBTs offer the optimum performance for induction heating, telecom, ESS and PFC applications where low conduction and switching losses are essential.





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	80	A
	Collector Current	@ T_C = 100°C	40	A
$I_{CM\ (1)}$	Pulsed Collector Current	@ T_C = 25°C	160	A
P_D	Maximum Power Dissipation	@ T_C = 25°C	290	W
	Maximum Power Dissipation	@ T_C = 100°C	116	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	--	0.43	°C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction-to-Case		1.5	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	40	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Packaging Type	Qty per Tube	Max Qty per Box
FGH80N60FD	FGH80N60FDTU	TO-247	Tube	30ea	-

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
ΔBV_{CES} / ΔT_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	--	--	±400	nA
On Characteristics						
$V_{GE(th)}$	G-E Threshold Voltage	I_C = 250 uA, $V_{CE} = V_{GE}$	4.5	5.5	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 40 A, V_{GE} = 15 V	--	1.8	2.4	V
		I_C = 40 A, V_{GE} = 15 V, T_C = 125°C	--	2.05	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	--	2110	--	pF
C_{oes}	Output Capacitance		--	200	--	pF
C_{res}	Reverse Transfer Capacitance		--	60	--	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 400 V, I_C = 40 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 25°C	--	21	--	ns
t_r	Rise Time		--	56	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	126	--	ns
t_f	Fall Time		--	50	100	ns
E_{on}	Turn-On Switching Loss		--	1	1.5	mJ
E_{off}	Turn-Off Switching Loss		--	0.52	0.78	mJ
E_{ts}	Total Switching Loss		--	1.52	2.28	mJ
$t_{d(on)}$	Turn-On Delay Time	V_{CC} = 400 V, I_C = 40 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load, T_C = 125°C	--	20	--	ns
t_r	Rise Time		--	54	--	ns
$t_{d(off)}$	Turn-Off Delay Time		--	131	--	ns
t_f	Fall Time		--	70	--	ns
E_{on}	Turn-On Switching Loss		--	1.1	--	mJ
E_{off}	Turn-Off Switching Loss		--	0.78	--	mJ
E_{ts}	Total Switching Loss		--	1.88	--	mJ
Q_g	Total Gate Charge	V_{CE} = 400 V, I_C = 40 A, V_{GE} = 15 V	--	120	--	nC
Q_{ge}	Gate-Emitter Charge		--	14	--	nC
Q_{gc}	Gate-Collector Charge		--	58	--	nC

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

Symbol	Parameter	Test Conditions		Min.	Typ.	Max	Unit
V_{FM}	Diode Forward Voltage	I_F = 20A	T_C = 25°C	-	2.3	2.8	V
			T_C = 125°C	-	1.7	-	
t_{rr}	Diode Reverse Recovery Time	I_{ES} =20A, dI_{ES} / dt = 200 A/µs	T_C = 25°C	-	36	-	ns
			T_C = 125°C	-	105	-	
I_{rr}	Diode Reverse Recovery Current		T_C = 25°C	-	2.6	-	ns
			T_C = 125°C	-	7.8	-	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	-	46.8	-	nC
			T_C = 125°C	-	409	-	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

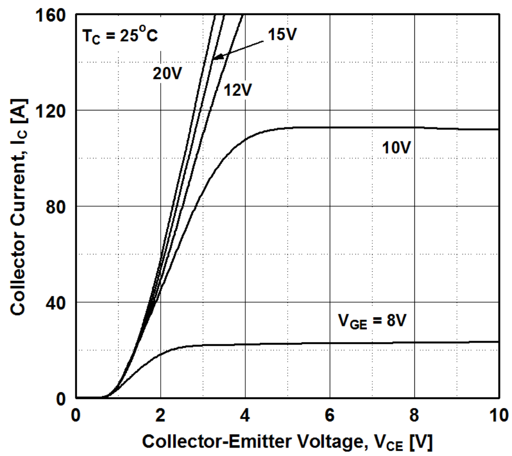


Figure 2. Typical Saturation Voltage Characteristics

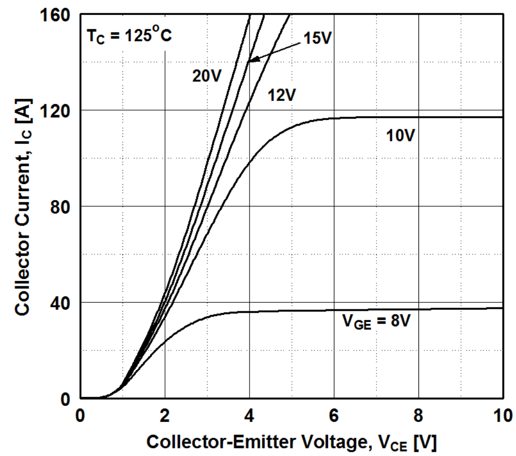


Figure 3. Typical Saturation Voltage Characteritics

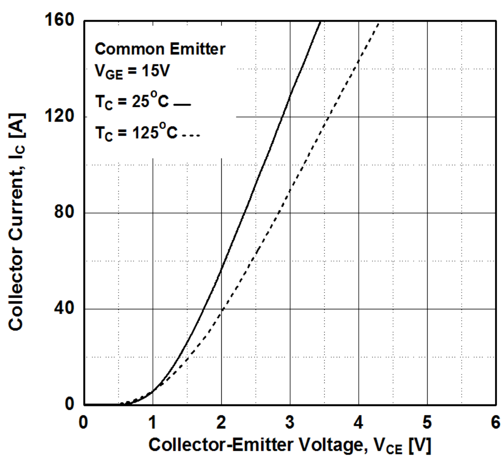


Figure 4. Transfer Characteristics

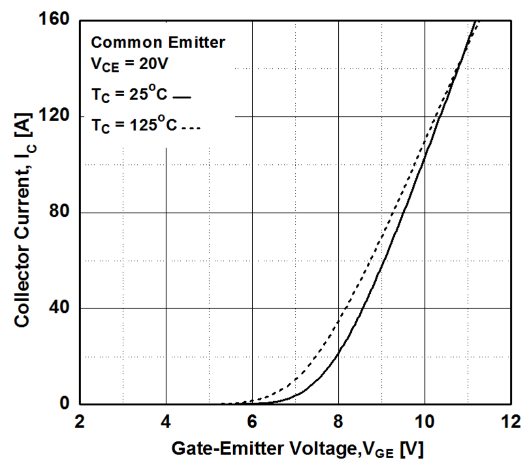


Figure 5. Saturation Voltage vs. Case

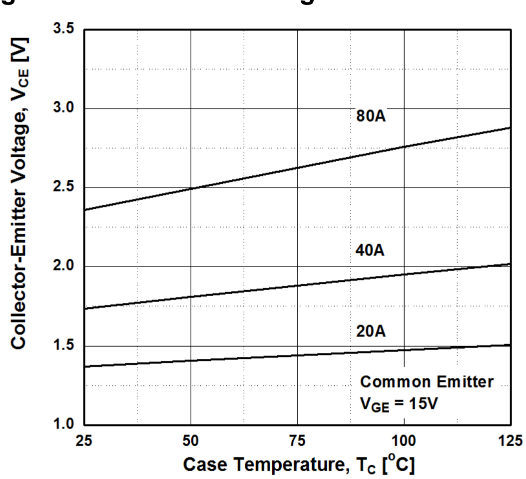
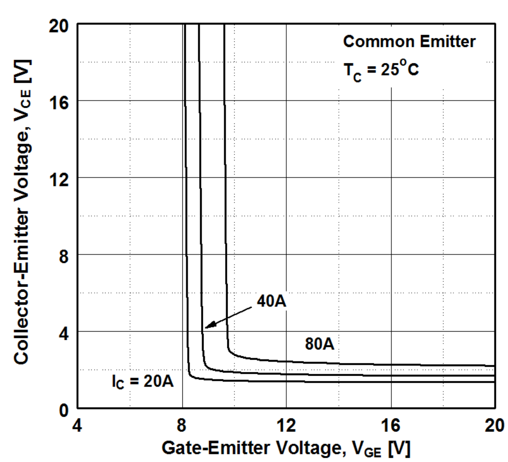


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. Vge

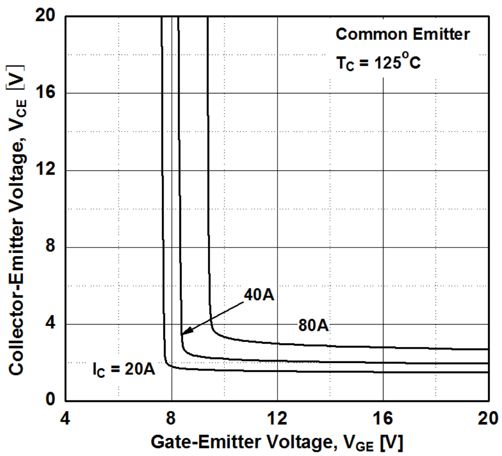


Figure 8. Capacitance Characteristics

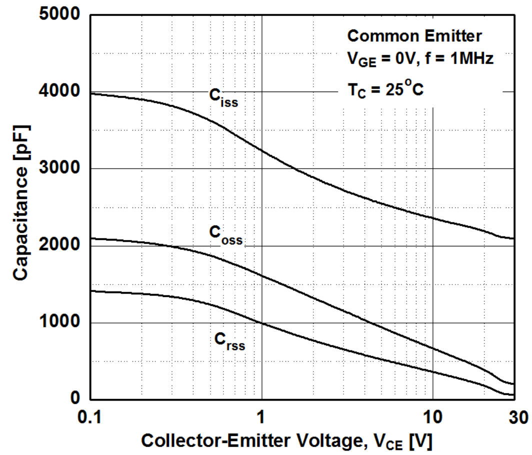


Figure 9. Gate Charge Characteristics

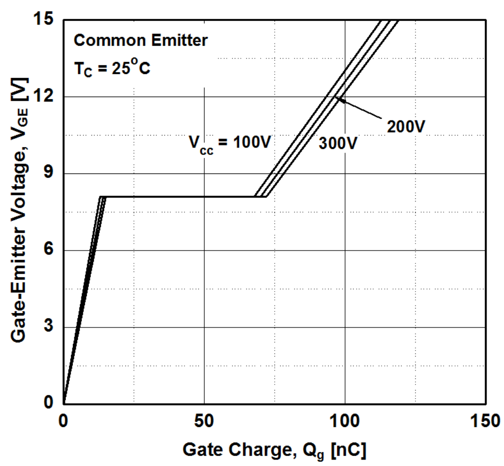


Figure 10. SOA Characteeristics

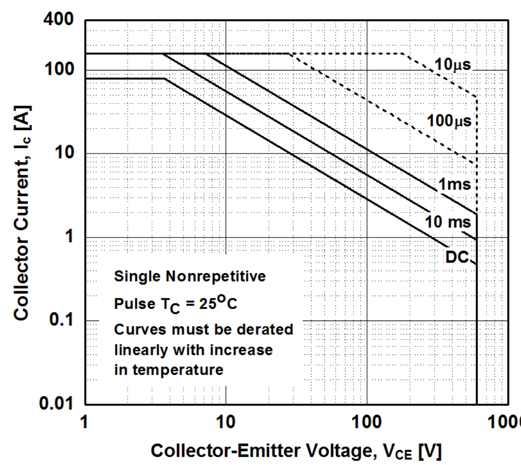


Figure 11. Turn-Off Switching SOA Characteristics

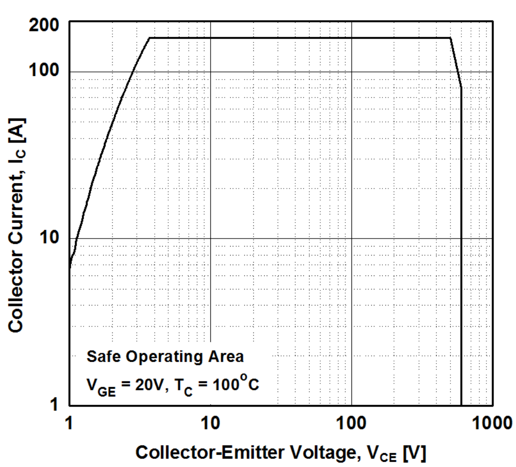
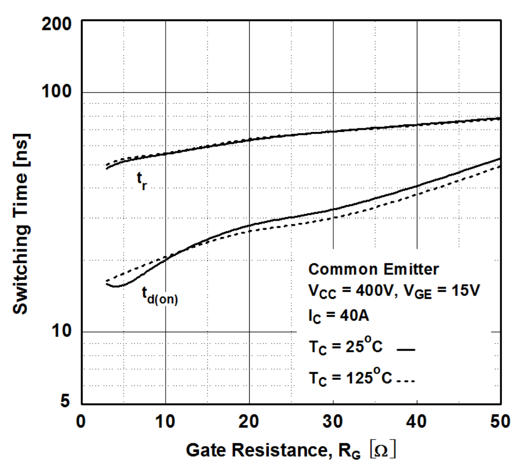


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

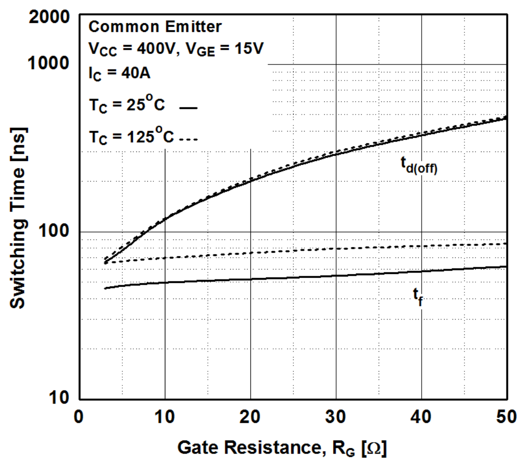


Figure 14. Turn-On Characteristics vs. Collector Current

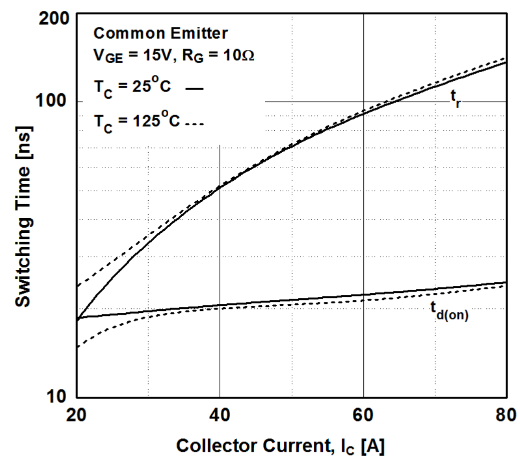


Figure 15. Turn-Off Characteristics vs. Collector Current

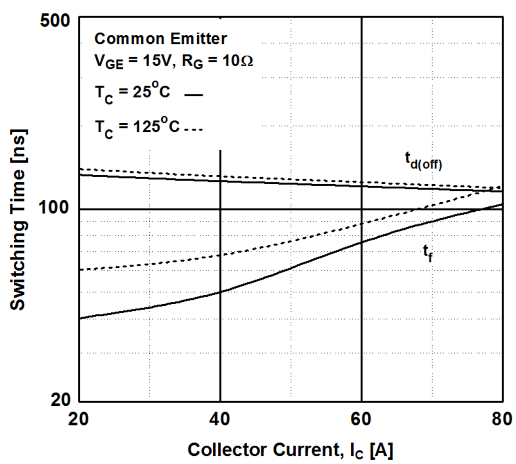


Figure 16. Switching Loss vs Gate Resistance

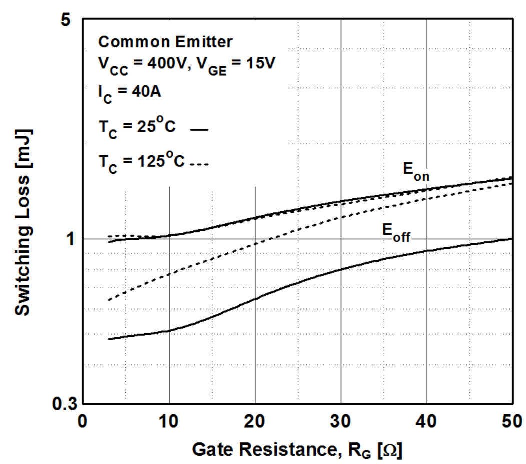
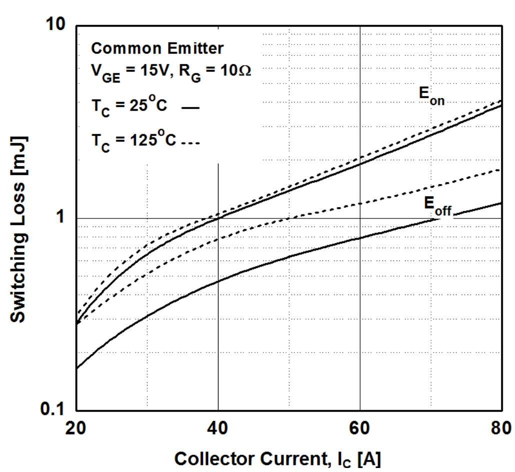


Figure 17. Switching Loss vs Collector Current



Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT

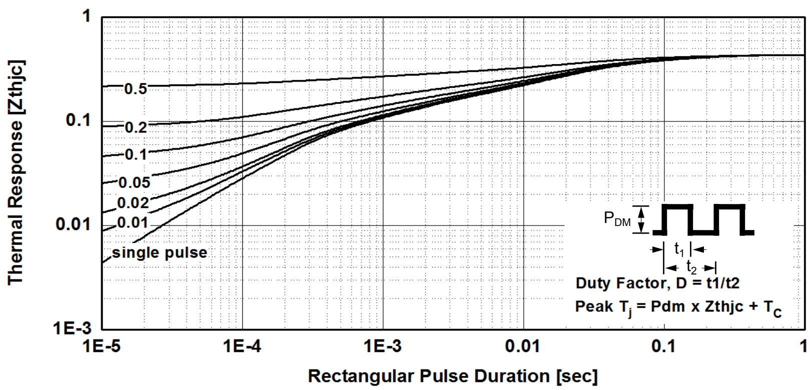


Figure 19. Typical Forward Voltage Drop

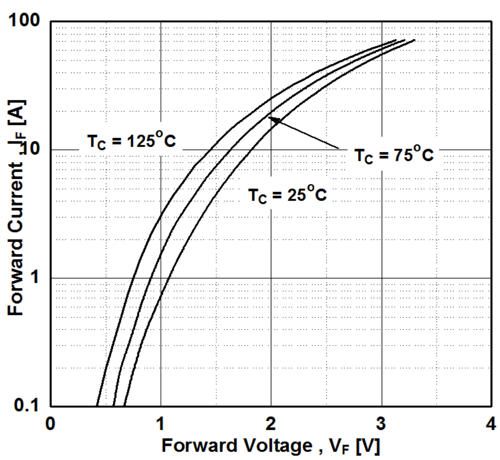


Figure 20. Stored Charge

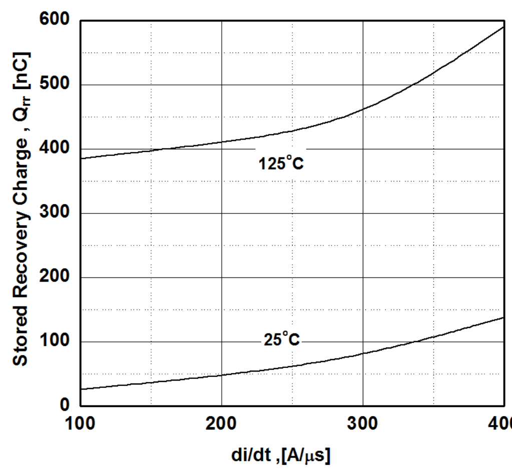


Figure 21. Reverse Recovery Time

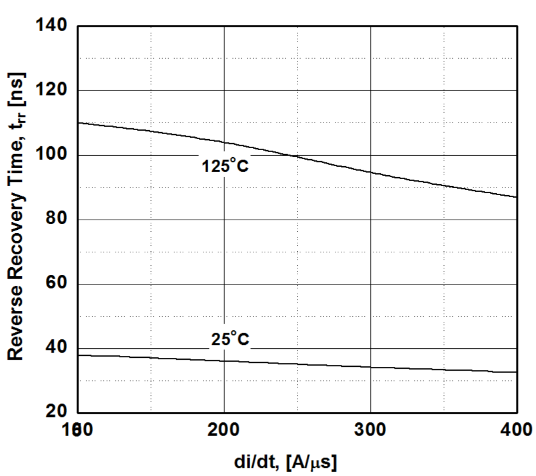
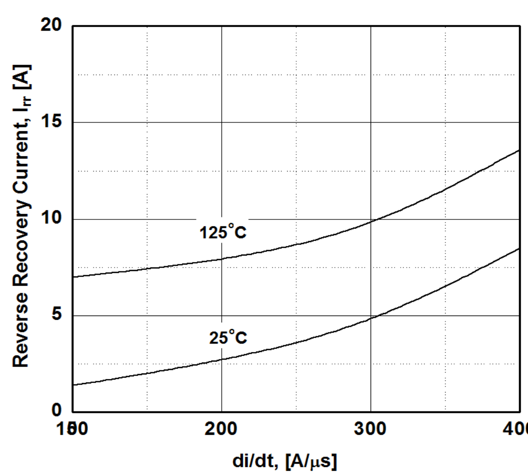
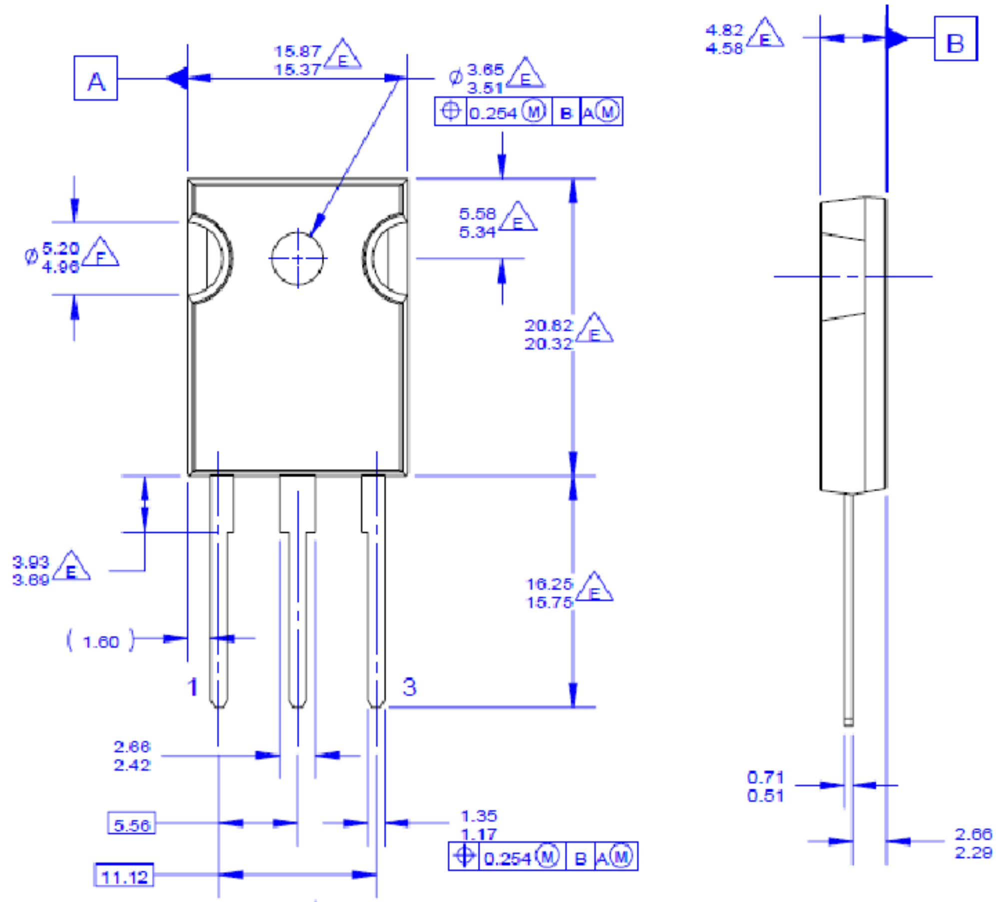


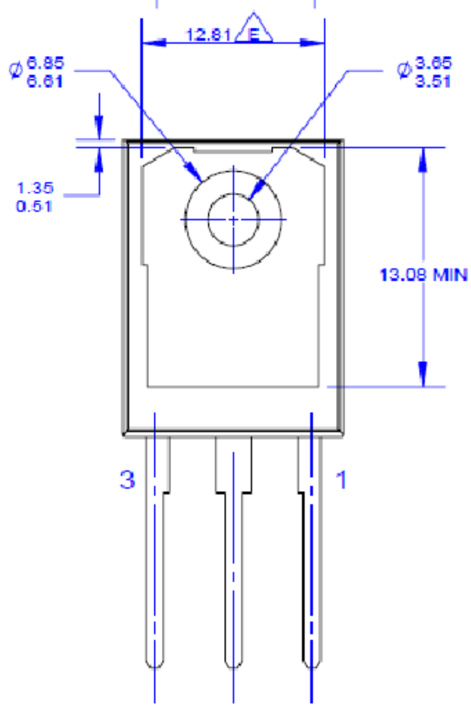
Figure 22. Reverse Recovery Current



Mechanical Dimensions

TO-247A03





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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.
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