FAIRCHILD SEMICONDUCTOR®

April 2008

FGH80N60FD2

600V, 80A Field Stop IGBT

Features

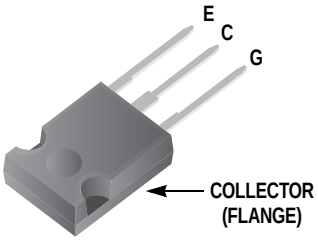
- High current capability
- Low saturation voltage: $V_{CE(sat)}$ =1.8V @ I_C = 40A
- High input impedance
- Fast switching
- RoHS compliant

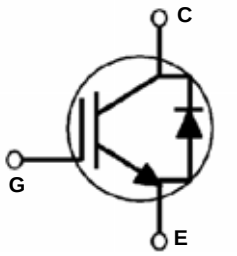
Applications

- Induction Heating Application

General Description

Using Novel Field Stop IGBT Technology, Fairchild's new series of Field Stop IGBTs offer the optimum performance for Induction Heating applications where low conduction and switching losses are essential.





Absolute Maximum Ratings

Symbol	Description		Ratings	Units
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.	Units
$R_{\theta JC}$(IGBT)	Thermal Resistance, Junction-to-Case	--	0.43	°C/W
$R_{\theta JC}$(Diode)	Thermal Resistance, Junction-to-Case		1.45	°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
FGH80N60FD2	FGH80N60FD2TU	TO-247	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-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250uA	600	--	--	V
$\Delta BV_{CES}/\Delta T_J$	Temperature Coefficient of Breakdown Voltage	V_{GE} = 0V, I_C = 250uA	--	0.6	--	V/°C
I_{CES}	Collector Cut-Off Current	V_{CE} = V_{CES}, V_{GE} = 0V	--	--	250	uA
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}	4.5	5.5	7.0	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	I_C = 40A, V_{GE} = 15V	--	1.8	2.4	V
		I_C = 40A, V_{GE} = 15V, T_C = 125°C	--	2.05	--	V
Dynamic Characteristics						
C_{ies}	Input Capacitance	V_{CE} = 30V, V_{GE} = 0V, f = 1MHz	--	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 = 40A, R_G = 10Ω, V_{GE} = 15V, 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 = 40A, R_G = 10Ω, V_{GE} = 15V, 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 = 40A, V_{GE} = 15V	--	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	Units
V_{FM}	Diode Forward Voltage	I_F = 15A	T_C = 25°C	-	1.2	1.5	V
			T_C = 125°C	-	1.0	-	
t_{rr}	Diode Reverse Recovery Time	I_{ES} =15A, dI_{ES}/dt = 200A/μs	T_C = 25°C	-	61	-	ns
			T_C = 125°C	-	125	-	
I_{rr}	Diode Reverse Recovery Current		T_C = 25°C	-	4.8	-	ns
			T_C = 125°C	-	8.4	-	
Q_{rr}	Diode Reverse Recovery Charge		T_C = 25°C	-	146	-	nC
			T_C = 125°C	-	525	-	

Typical Performance Characteristics

Figure 1. Typical Output Characteristics

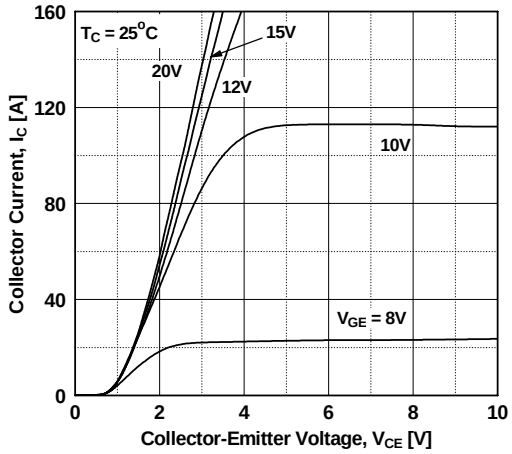


Figure 2. Typical Saturation Voltage Characteristics

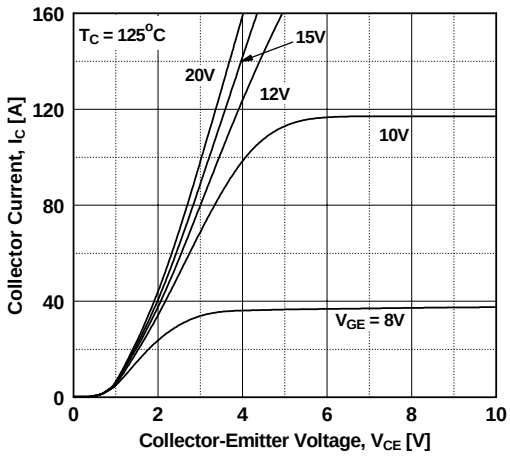


Figure 3. Typical Saturation Voltage Characteritics

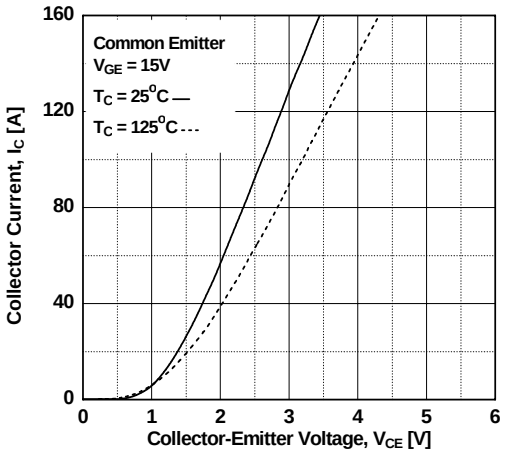


Figure 4. Transfer Characteristics

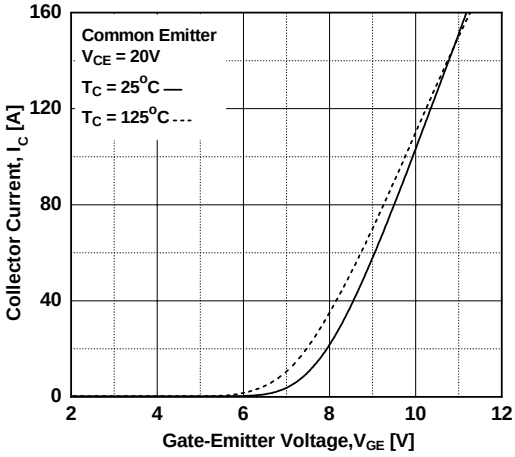


Figure 5. Saturation Voltage vs. Case

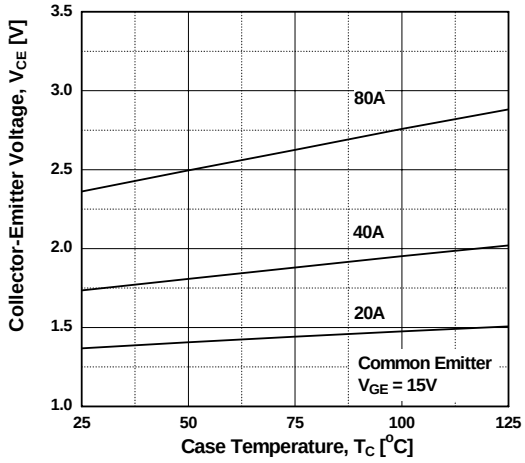
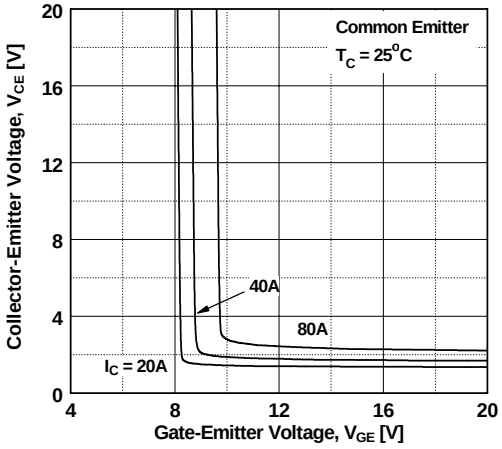


Figure 6. Saturation Voltage vs. Vge



Typical Performance Characteristics (Continued)

Figure 7. Saturation Voltage vs. Vge

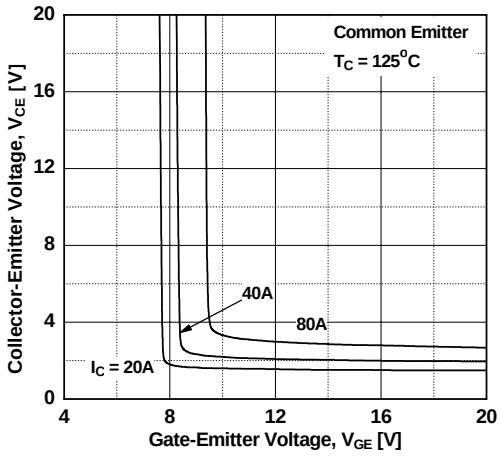


Figure 8. Capacitance Characteristics

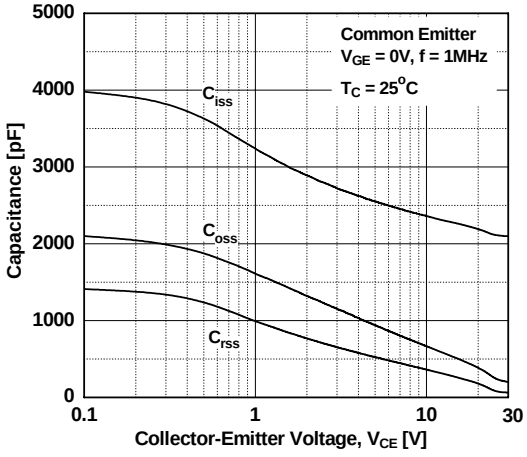


Figure 9. Gate Charge Characteristics

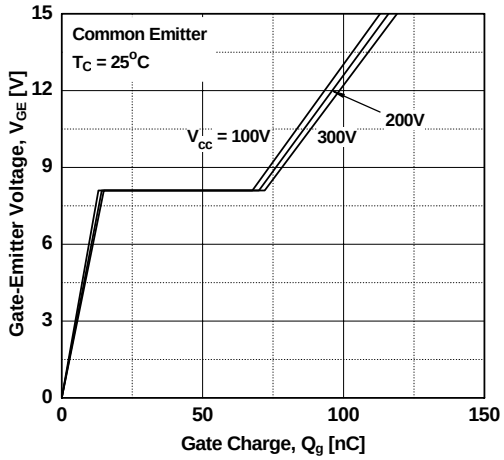


Figure 10. SOA Characteeristics

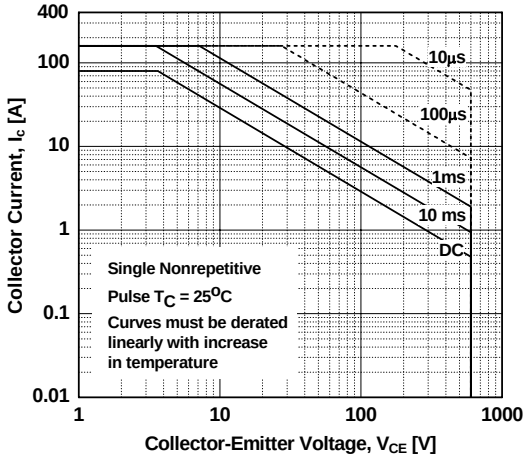


Figure 11. Turn-Off Switching SOA Characteristics

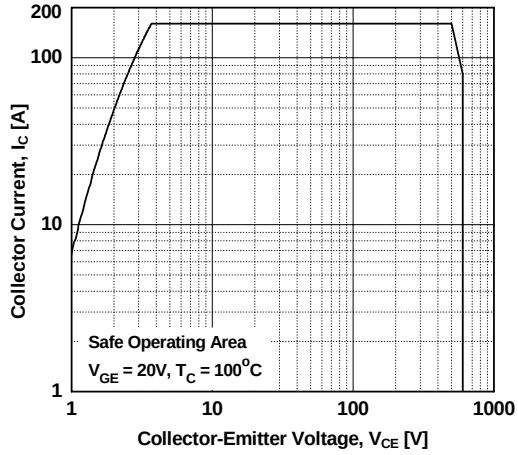
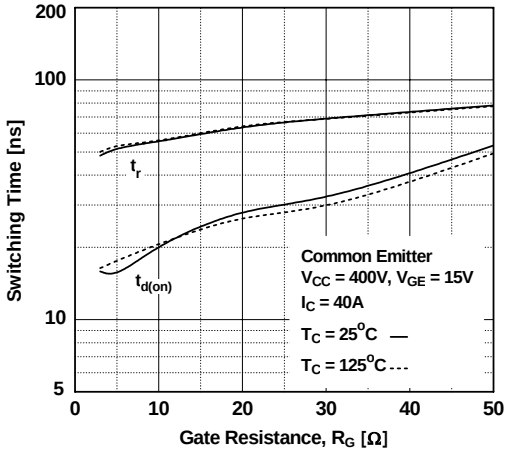


Figure 12. Turn-On Characteristics vs. Gate Resistance



Typical Performance Characteristics (Continued)

Figure 13. Turn-Off Characteristics vs. Gate Resistance

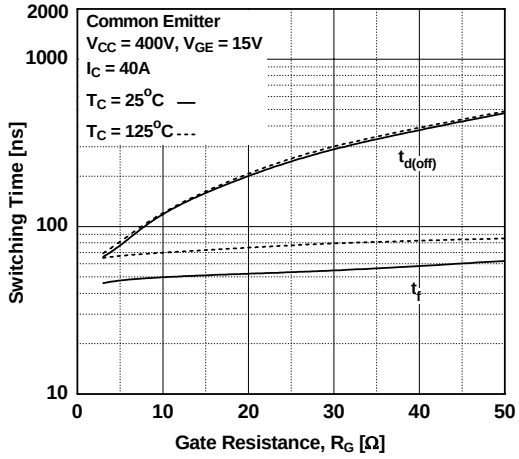


Figure 14. Turn-On Characteristics vs. Collector Current

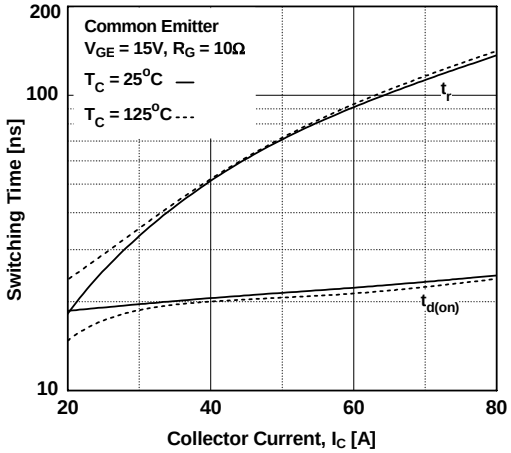


Figure 15. Turn-Off Characteristics vs. Collector Current

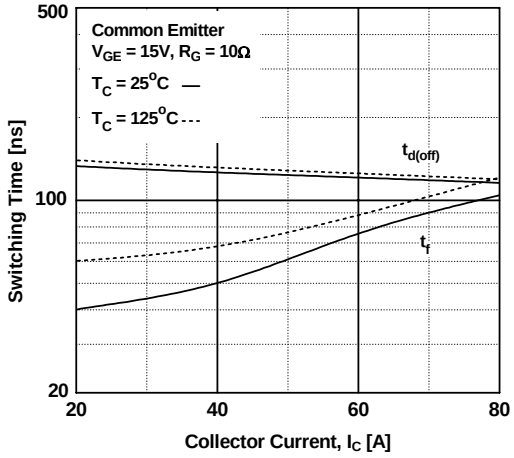


Figure 16. Switching Loss vs Gate Resistance

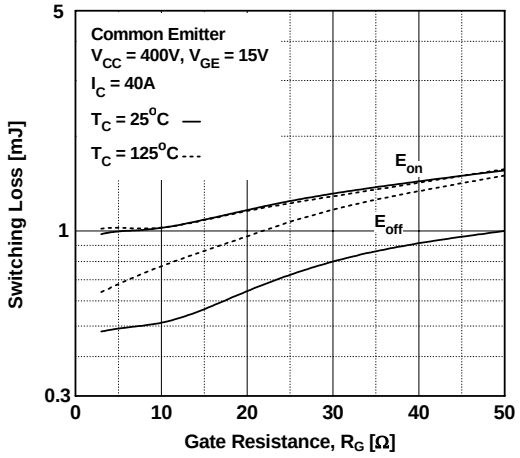
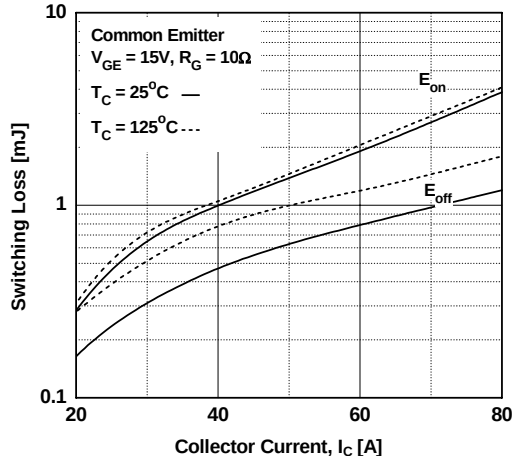


Figure 17. Switching Loss vs Collector Current



Typical Performance Characteristics (Continued)

Figure 18. Transient Thermal Impedance of IGBT

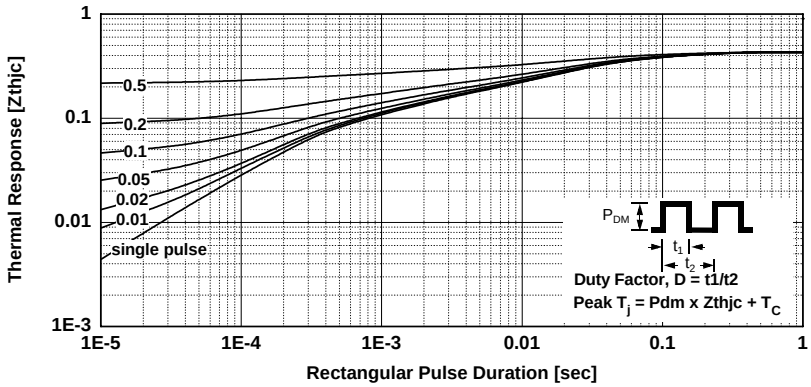


Figure 19. Typical Forward Voltage Drop

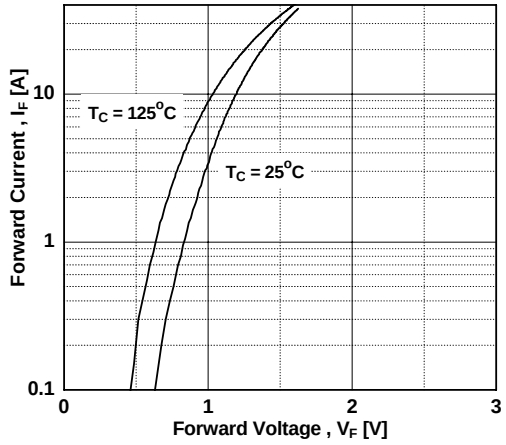


Figure 20. Stored Charge

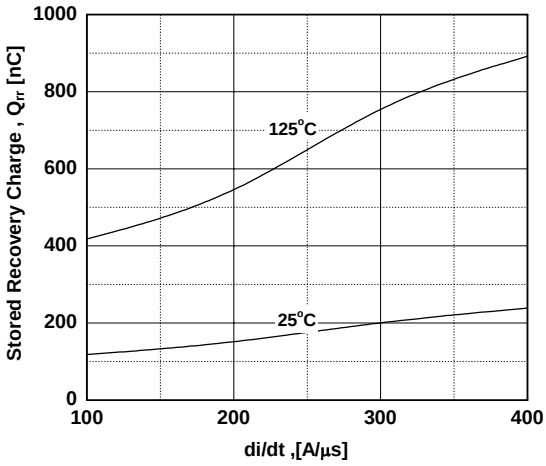


Figure 21. Reverse Recovery Time

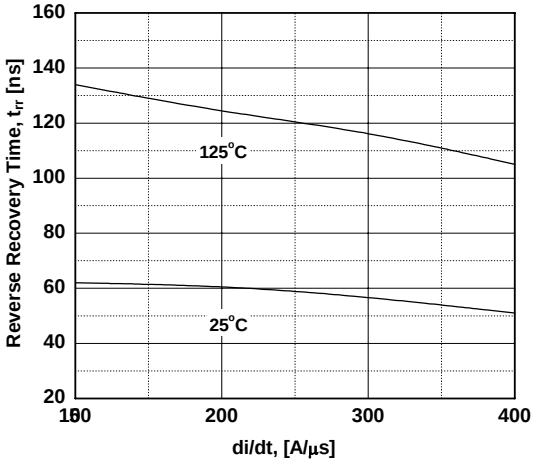
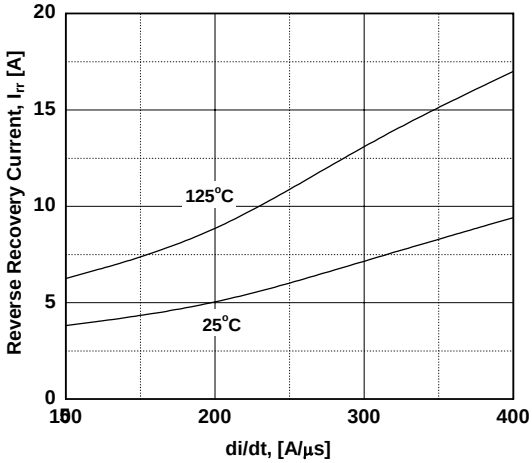
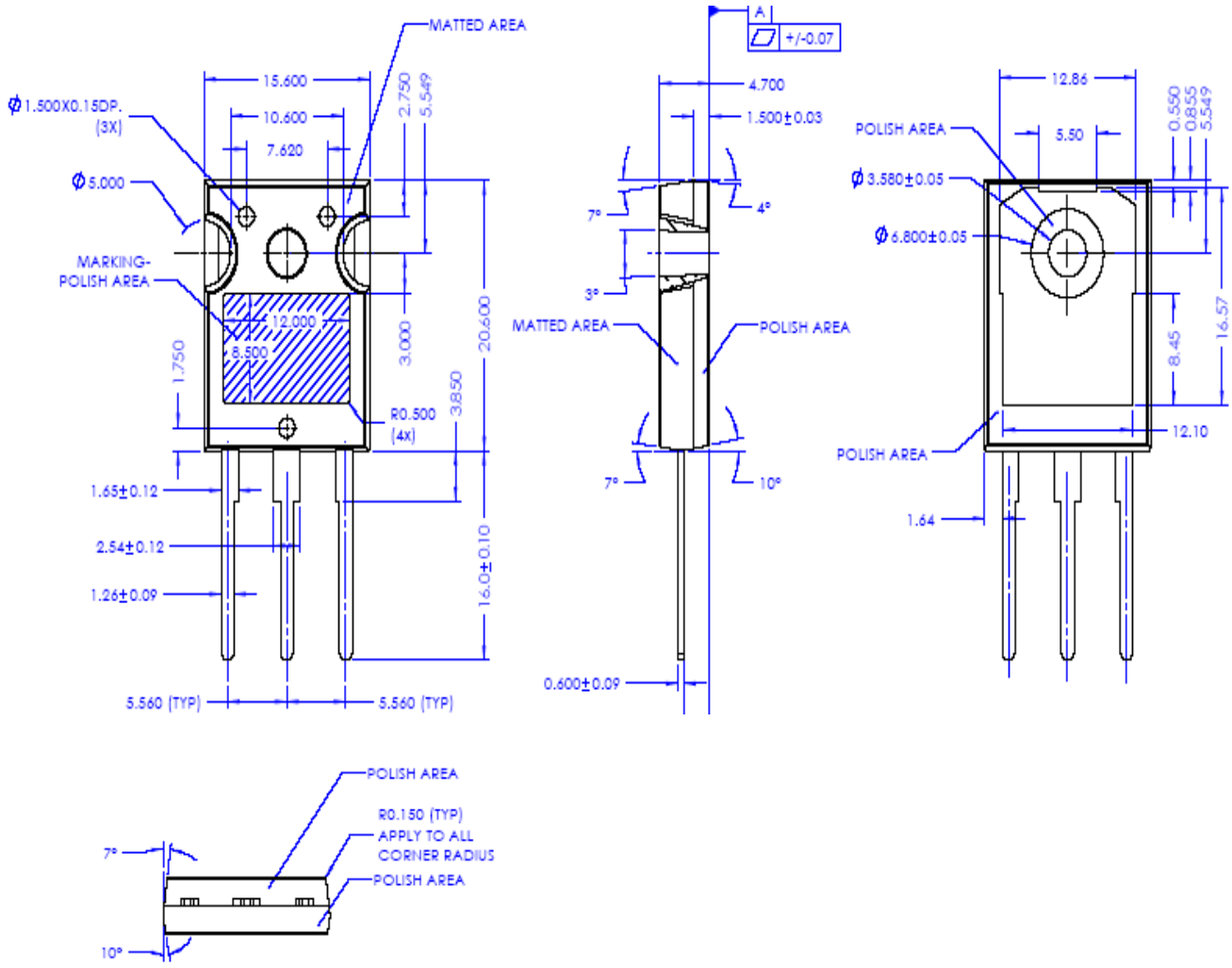


Figure 22. Reverse Recovery Current



Mechanical Dimensions

TO-247AB (FKS PKG CODE 001)



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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.

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