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# FGH40T120SMD / FGH40T120SMD\_F155

## 1200 V, 40 A FS Trench IGBT



### Features

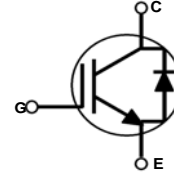
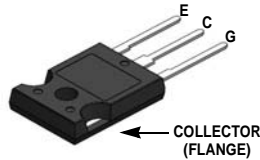
- FS Trench Technology, Positive Temperature Coefficient
- High Speed Switching
- Low Saturation Voltage:  $V_{CE(sat)} = 1.8\text{ V @ } I_C = 40\text{ A}$
- 100% of the Parts tested for  $I_{LM}(1)$
- High Input Impedance
- RoHS Compliant

### General Description

Using innovative field stop trench IGBT technology, Fairchild®'s new series of field stop trench IGBTs offer the optimum performance for hard switching application such as solar inverter, UPS, welder and PFC applications.

### Applications

- Solar Inverter, Welder, UPS & PFC applications.



### Absolute Maximum Ratings $T_C = 25^\circ\text{C}$ unless otherwise noted

Symbol	Description	Ratings	Unit
$V_{CES}$	Collector to Emitter Voltage	1200	V
$V_{GES}$	Gate to Emitter Voltage	$\pm 25$	V
	Transient Gate to Emitter Voltage	$\pm 30$	V
$I_C$	Collector Current @ $T_C = 25^\circ\text{C}$	80	A
	Collector Current @ $T_C = 100^\circ\text{C}$	40	A
$I_{LM}(1)$	Clamped Inductive Load Current @ $T_C = 25^\circ\text{C}$	160	A
$I_{CM}(2)$	Pulsed Collector Current	160	A
$I_F$	Diode Continuous Forward Current @ $T_C = 25^\circ\text{C}$	80	A
	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	40	A
$I_{FM}$	Diode Maximum Forward Current	240	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	555	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	277	W
$T_J$	Operating Junction Temperature	-55 to +175	$^\circ\text{C}$
$T_{stg}$	Storage Temperature Range	-55 to +175	$^\circ\text{C}$
$T_L$	Maximum Lead Temp. for soldering Purposes, 1/8" from case for 5 seconds	300	$^\circ\text{C}$

### Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JC}(IGBT)$	Thermal Resistance, Junction to Case	--	0.27	$^\circ\text{C/W}$
$R_{\theta JC}(\text{Diode})$	Thermal Resistance, Junction to Case	--	0.89	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ\text{C/W}$

**Notes:**

1.  $V_{CC} = 600\text{ V}, V_{GE} = 15\text{ V}, I_C = 160\text{ A}, R_G = 10\ \Omega$ . Inductive Load
2. Limited by  $T_{jmax}$

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGH40T120SMD	FGH40T120SMD	TO-247 A03	-	-	30
FGH40T120SMD	FGH40T120SMD_F155	TO-247G03	-	-	30

### Electrical Characteristics of the IGBT T<sub>C</sub> = 25°C unless otherwise noted

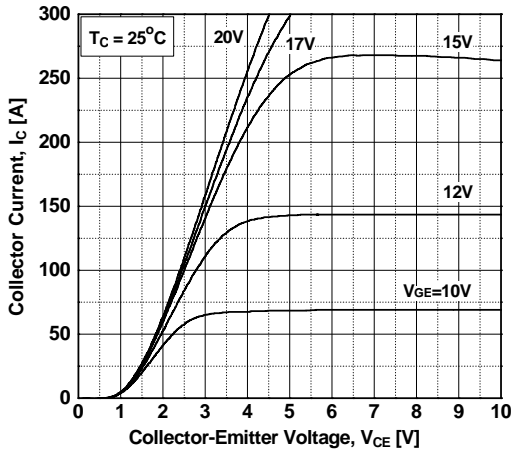
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
<b>Off Characteristics</b>						
$V_{CES}$	Collector to Emitter Breakdown Voltage	$V_{GE} = 0\text{ V}, I_C = 250\text{ }\mu\text{A}$	1200	-	-	V
$I_{CES}$	Collector Cut-Off Current	$V_{CE} = V_{CES}, V_{GE} = 0\text{ V}$	-	-	250	$\mu\text{A}$
$I_{GES}$	G-E Leakage Current	$V_{GE} = V_{GES}, V_{CE} = 0\text{ V}$	-	-	$\pm 400$	nA
<b>On Characteristics</b>						
$V_{GE(th)}$	G-E Threshold Voltage	$I_C = 40\text{ mA}, V_{CE} = V_{GE}$	4.9	6.2	7.5	V
$V_{CE(sat)}$	Collector to Emitter Saturation Voltage	$I_C = 40\text{ A}, V_{GE} = 15\text{ V}$ $T_C = 25^\circ\text{C}$	-	1.8	2.4	V
		$I_C = 40\text{ A}, V_{GE} = 15\text{ V},$ $T_C = 175^\circ\text{C}$	-	2.0	-	V
<b>Dynamic Characteristics</b>						
$C_{ies}$	Input Capacitance	$V_{CE} = 30\text{ V}, V_{GE} = 0\text{ V},$ $f = 1\text{ MHz}$	-	4300	-	pF
$C_{oes}$	Output Capacitance		-	180	-	pF
$C_{res}$	Reverse Transfer Capacitance		-	100	-	pF
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600\text{ V}, I_C = 40\text{ A},$ $R_G = 10\text{ }\Omega, V_{GE} = 15\text{ V},$ Inductive Load, $T_C = 25^\circ\text{C}$	-	40	-	ns
$t_r$	Rise Time		-	47	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	475	-	ns
$t_f$	Fall Time		-	10	-	ns
$E_{on}$	Turn-On Switching Loss		-	2.7	-	mJ
$E_{off}$	Turn-Off Switching Loss		-	1.1	-	mJ
$E_{ts}$	Total Switching Loss	-	3.8	-	mJ	
$t_{d(on)}$	Turn-On Delay Time	$V_{CC} = 600\text{ V}, I_C = 40\text{ A},$ $R_G = 10\text{ }\Omega, V_{GE} = 15\text{ V},$ Inductive Load, $T_C = 175^\circ\text{C}$	-	40	-	ns
$t_r$	Rise Time		-	55	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	520	-	ns
$t_f$	Fall Time		-	50	-	ns
$E_{on}$	Turn-On Switching Loss		-	3.4	-	mJ
$E_{off}$	Turn-Off Switching Loss		-	2.5	-	mJ
$E_{ts}$	Total Switching Loss	-	5.9	-	mJ	
$Q_g$	Total Gate Charge	$V_{CE} = 600\text{ V}, I_C = 40\text{ A},$ $V_{GE} = 15\text{ V}$	-	370	-	nC
$Q_{ge}$	Gate to Emitter Charge		-	23	-	nC
$Q_{gc}$	Gate to Collector Charge		-	210	-	nC

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

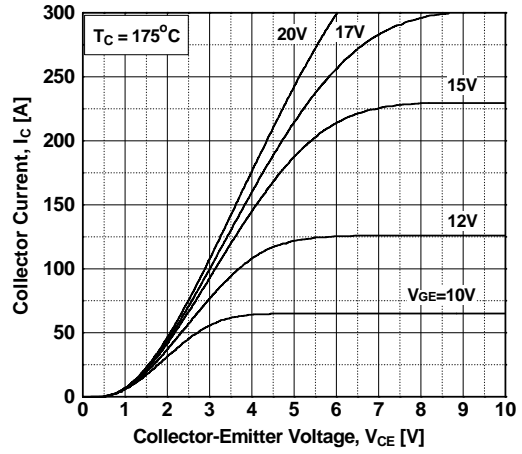
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{FM}$	Diode Forward Voltage	$I_F = 40\text{ A}, T_C = 25^\circ\text{C}$	-	3.8	4.8	V
		$I_F = 40\text{ A}, T_C = 175^\circ\text{C}$	-	2.7	-	V
$t_{rr}$	Diode Reverse Recovery Time	$V_R = 600\text{ V}, I_F = 40\text{ A},$ $di_F/dt = 200\text{ A/us}, T_C = 25^\circ\text{C}$	-	65	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	7.2	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	234	-	nC
$t_{rr}$	Diode Reverse Recovery Time	$V_R = 600\text{ V}, I_F = 40\text{ A},$ $di_F/dt = 200\text{ A/us}, T_C = 175^\circ\text{C}$	-	200	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	18.0	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	1800	-	nC

## Typical Performance Characteristics

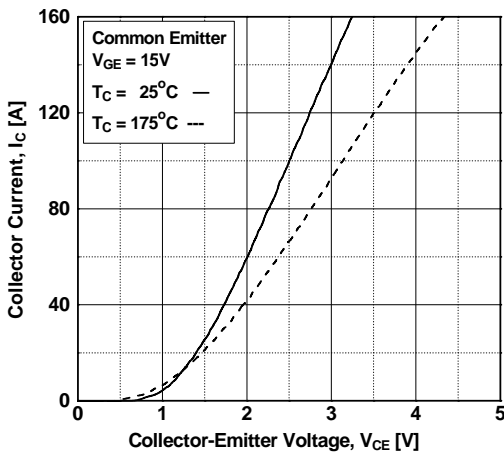
**Figure 1. Typical Output Characteristics**



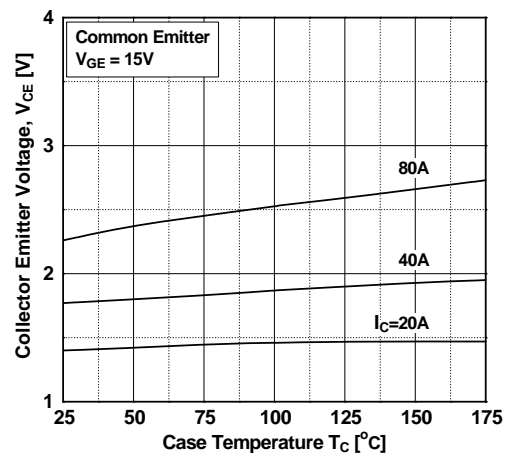
**Figure 2. Typical Output Characteristics**



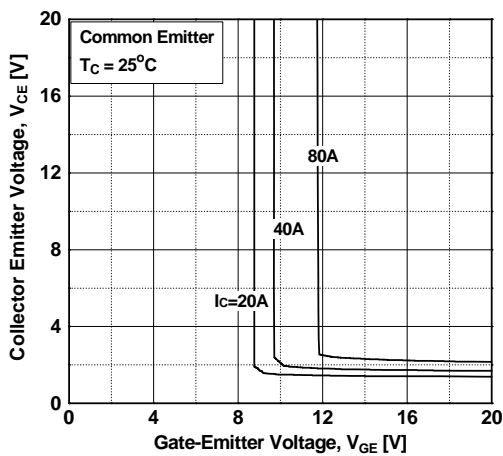
**Figure 3. Typical Saturation Voltage Characteristics**



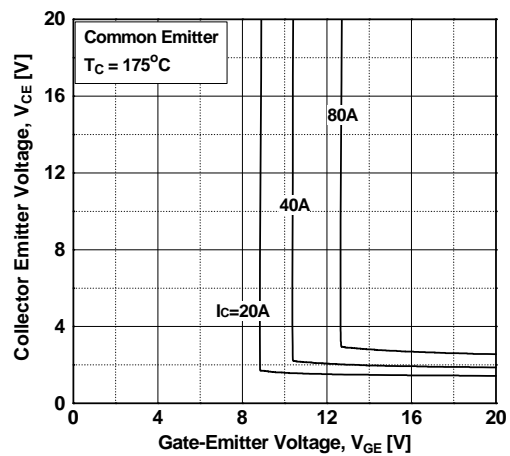
**Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level**



**Figure 5. Saturation Voltage vs. Vge**



**Figure 6. Saturation Voltage vs. Vge**



## Typical Performance Characteristics

Figure 7. Capacitance Characteristics

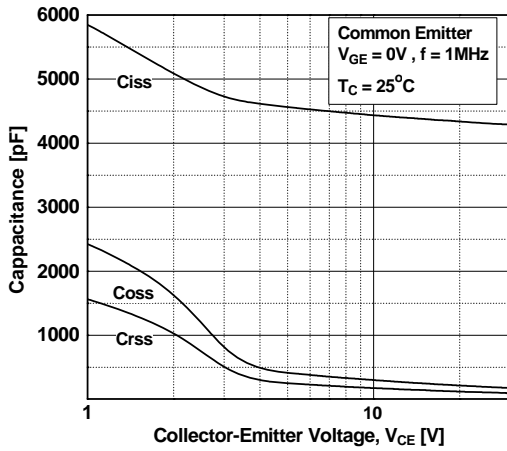


Figure 8. Load Current vs. Frequency

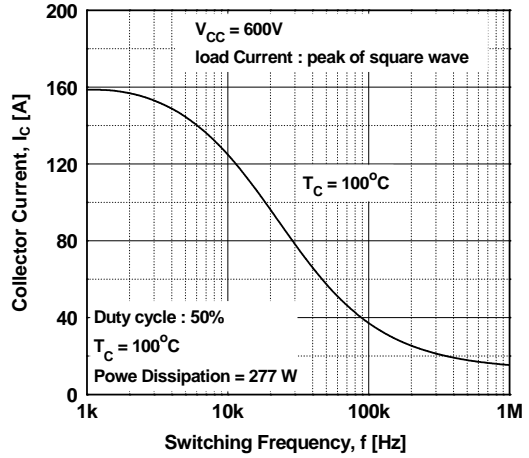


Figure 9. Turn-on Characteristics vs. Gate Resistance

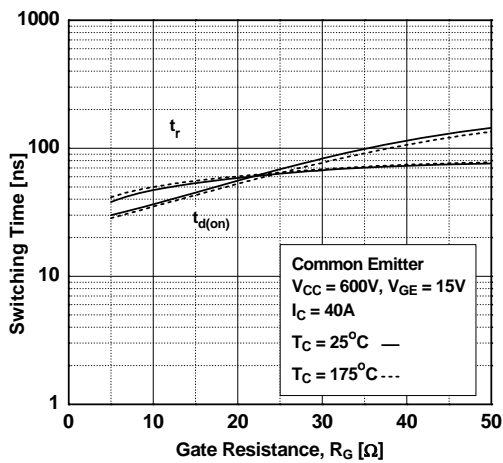


Figure 10. Turn-off Characteristics vs. Gate Resistance

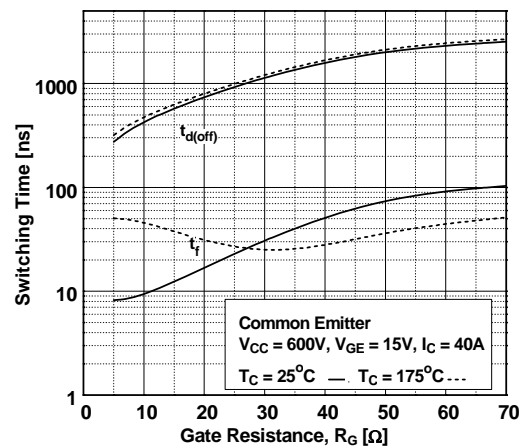


Figure 11. Switching Loss vs. Gate Resistance

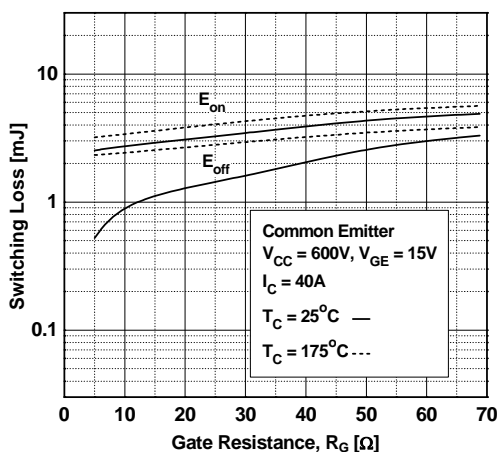
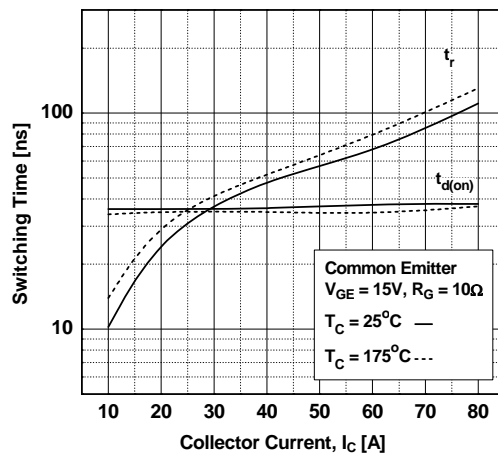


Figure 12. Turn-on Characteristics vs. Collector Current



## Typical Performance Characteristics

Figure 13. Turn-off Characteristics vs. Collector Current

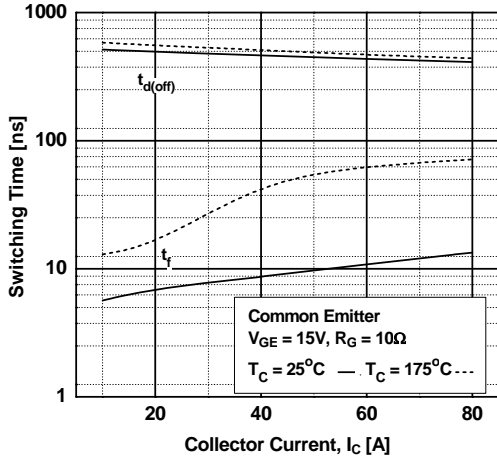


Figure 15. Gate Charge Characteristics

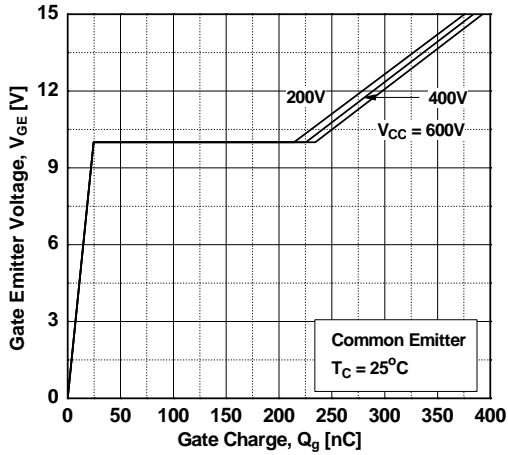


Figure 17. Forward Characteristics

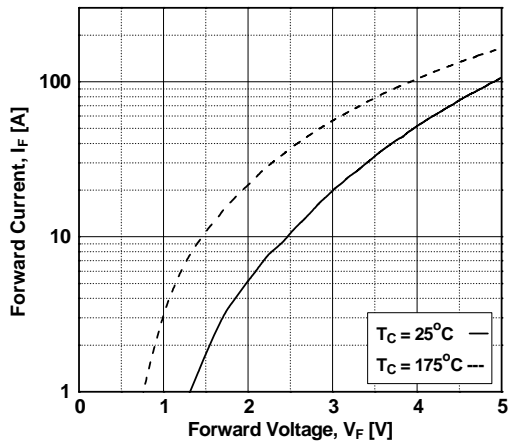


Figure 14. Switching Loss vs. Collector Current

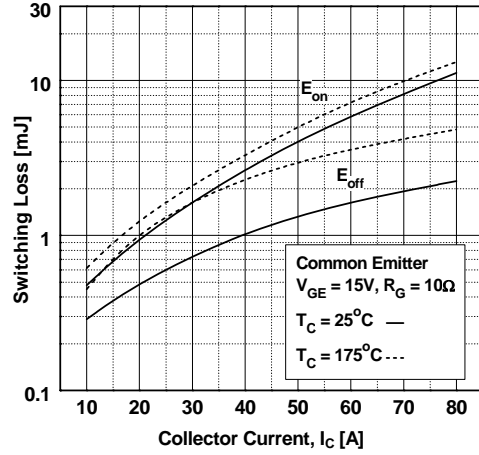


Figure 16. SOA Characteristics

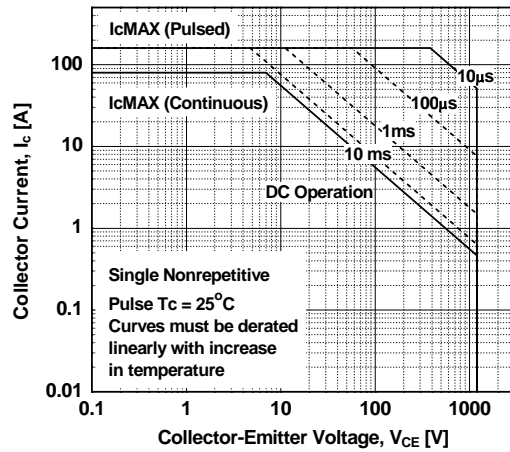
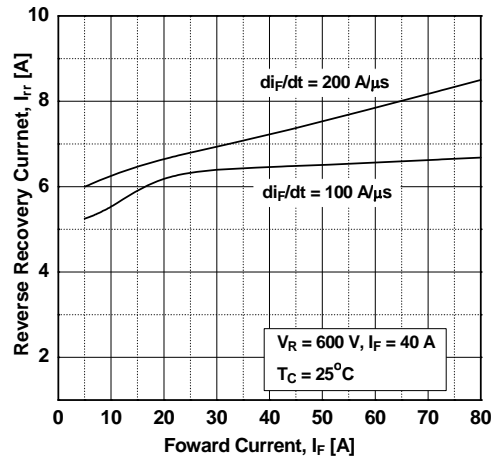


Figure 18. Reverse Recovery Current



## Typical Performance Characteristics

Figure 19. Reverse Recovery Time

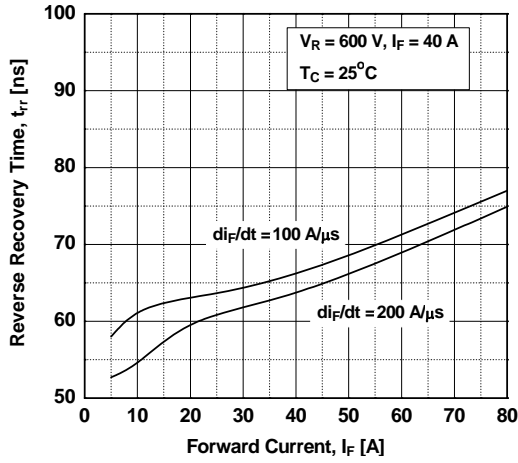


Figure 20. Stored Charge

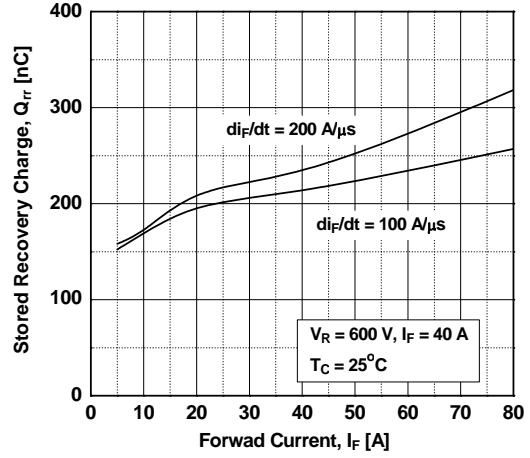
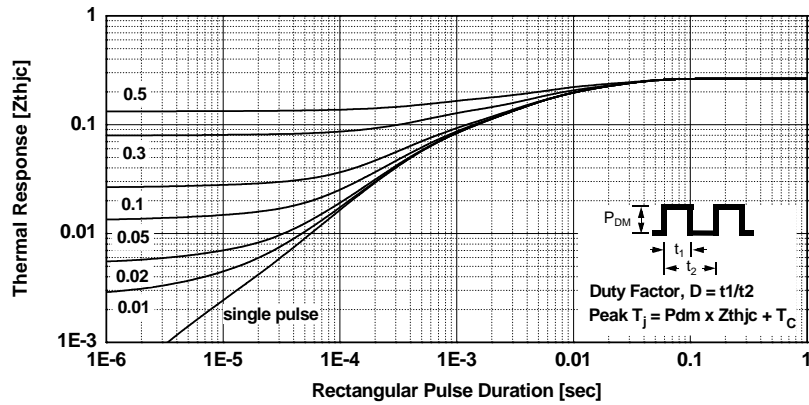


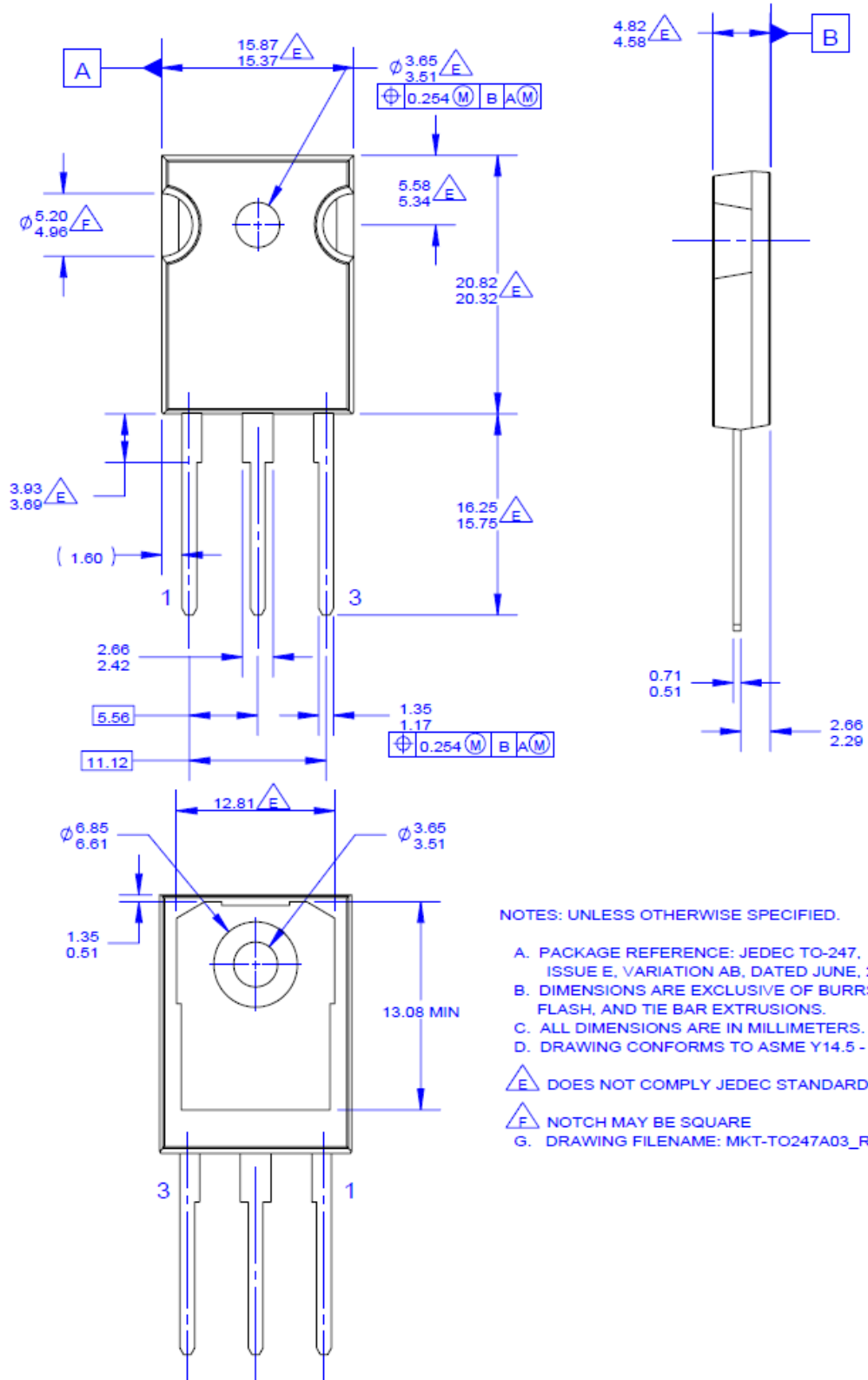
Figure 21. Transient Thermal Impedance of IGBT





Mechanical Dimensions

TO - 247A03

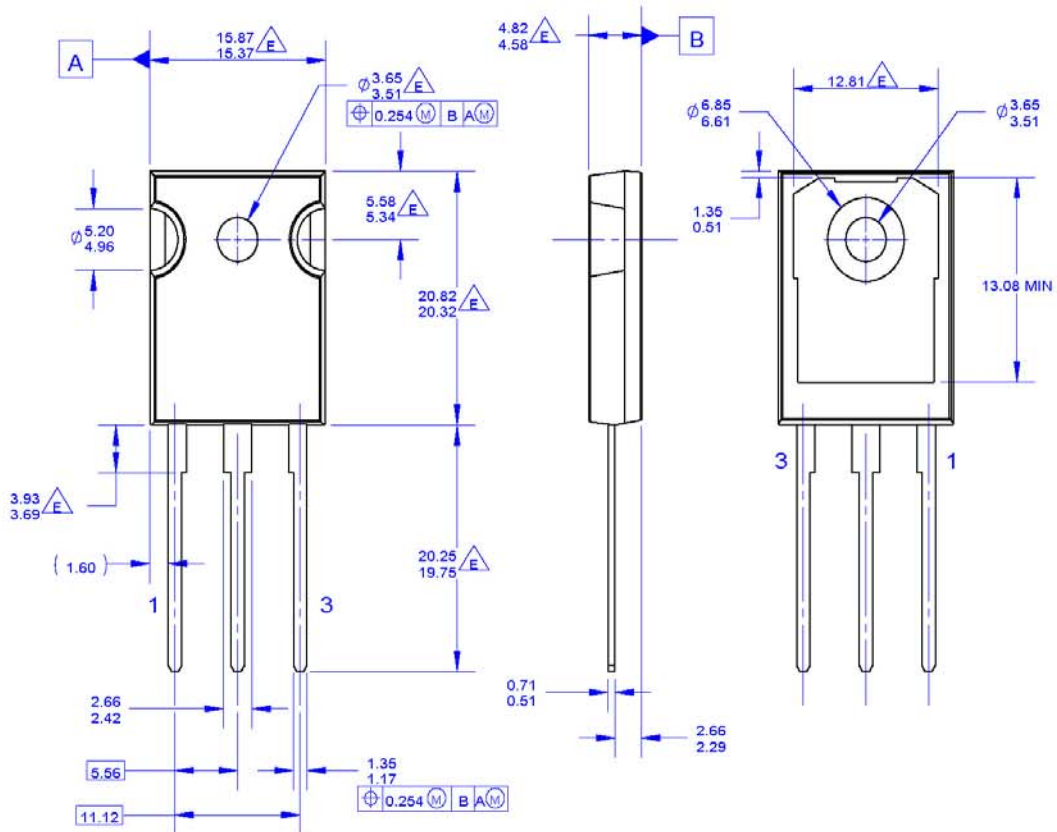


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**Mechanical Dimensions**

**TO-247G03**



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# Mouser Electronics

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Компания «Life Electronics» занимается поставками электронных компонентов импортного и отечественного производства от производителей и со складов крупных дистрибьюторов Европы, Америки и Азии.

С конца 2013 года компания активно расширяет линейку поставок компонентов по направлению коаксиальный кабель, кварцевые генераторы и конденсаторы (керамические, пленочные, электролитические), за счёт заключения дистрибьюторских договоров

Мы предлагаем:

- Конкурентоспособные цены и скидки постоянным клиентам.
- Специальные условия для постоянных клиентов.
- Подбор аналогов.
- Поставку компонентов в любых объемах, удовлетворяющих вашим потребностям.
- Приемлемые сроки поставки, возможна ускоренная поставка.
- Доставку товара в любую точку России и стран СНГ.
- Комплексную поставку.
- Работу по проектам и поставку образцов.
- Формирование склада под заказчика.
- Сертификаты соответствия на поставляемую продукцию (по желанию клиента).
- Тестирование поставляемой продукции.
- Поставку компонентов, требующих военную и космическую приемку.
- Входной контроль качества.
- Наличие сертификата ISO.

В составе нашей компании организован Конструкторский отдел, призванный помогать разработчикам, и инженерам.

Конструкторский отдел помогает осуществить:

- Регистрацию проекта у производителя компонентов.
- Техническую поддержку проекта.
- Защиту от снятия компонента с производства.
- Оценку стоимости проекта по компонентам.
- Изготовление тестовой платы монтаж и пусконаладочные работы.



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