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# FGH15T120SMD

## 1200 V, 15 A Field Stop Trench IGBT

### Features

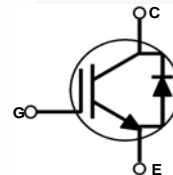
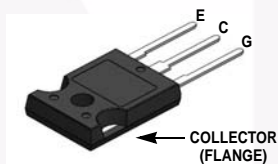
- FS Trench Technology, Positive Temperature Coefficient
- High Speed Switching
- Low Saturation Voltage:  $V_{CE(sat)} = 1.8 \text{ V @ } I_C = 15 \text{ A}$
- 100% of The Parts Tested for  $I_{LM}(1)$
- High Input Impedance
- RoHS Compliant

### 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 @ $T_C = 25^\circ\text{C}$	30	A
	Collector Current @ $T_C = 100^\circ\text{C}$	15	A
$I_{LM}(1)$	Clamped Inductive Load Current @ $T_C = 25^\circ\text{C}$	60	A
$I_{CM}(2)$	Pulsed Collector Current	60	A
$I_F$	Diode Continuous Forward Current @ $T_C = 25^\circ\text{C}$	30	A
	Diode Continuous Forward Current @ $T_C = 100^\circ\text{C}$	15	A
$I_{FM}$	Diode Maximum Forward Current	100	A
$P_D$	Maximum Power Dissipation @ $T_C = 25^\circ\text{C}$	333	W
	Maximum Power Dissipation @ $T_C = 100^\circ\text{C}$	167	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
$R_{\theta JC}(\text{IGBT})$	Thermal Resistance, Junction to Case	--	0.45	$^\circ\text{C}/\text{W}$
$R_{\theta JC}(\text{Diode})$	Thermal Resistance, Junction to Case	--	2.0	$^\circ\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	--	40	$^\circ\text{C}/\text{W}$

**Notes:**

1.  $V_{CC} = 600 \text{ V}, V_{GE} = 15 \text{ V}, I_C = 60 \text{ A}, R_G = 34 \Omega$ , Inductive Load
2. Limited by  $T_{jmax}$

### Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
FGH15T120SMD	FGH15T120SMD_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>						
BV <sub>CES</sub>	Collector to Emitter Breakdown Voltage	V <sub>GE</sub> = 0 V, I <sub>C</sub> = 250 μA	1200	-	-	V
I <sub>CES</sub>	Collector Cut-Off Current	V <sub>CE</sub> = V <sub>CES</sub> , V <sub>GE</sub> = 0 V	-	-	250	μA
I <sub>GES</sub>	G-E Leakage Current	V <sub>GE</sub> = V <sub>GES</sub> , V <sub>CE</sub> = 0 V	-	-	±400	nA
<b>On Characteristics</b>						
V <sub>GE(th)</sub>	G-E Threshold Voltage	I <sub>C</sub> = 15 mA, V <sub>CE</sub> = V <sub>GE</sub>	4.9	6.2	7.5	V
V <sub>CE(sat)</sub>	Collector to Emitter Saturation Voltage	I <sub>C</sub> = 15 A, V <sub>GE</sub> = 15 V T <sub>C</sub> = 25°C	-	1.8	2.4	V
		I <sub>C</sub> = 15 A, V <sub>GE</sub> = 15 V, T <sub>C</sub> = 175°C	-	1.9	-	V
<b>Dynamic Characteristics</b>						
C <sub>ies</sub>	Input Capacitance	V <sub>CE</sub> = 30 V, V <sub>GE</sub> = 0 V, f = 1MHz	-	1460	-	pF
C <sub>oes</sub>	Output Capacitance		-	65	-	pF
C <sub>res</sub>	Reverse Transfer Capacitance		-	37	-	pF
<b>Switching Characteristics</b>						
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 15 A, R <sub>G</sub> = 34 Ω, V <sub>GE</sub> = 15 V, Inductive Load, T <sub>C</sub> = 25°C	-	32	-	ns
t <sub>r</sub>	Rise Time		-	47	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	490	-	ns
t <sub>f</sub>	Fall Time		-	12	-	ns
E <sub>on</sub>	Turn-On Switching Loss		-	1.15	-	mJ
E <sub>off</sub>	Turn-Off Switching Loss		-	0.46	-	mJ
E <sub>ts</sub>	Total Switching Loss		-	1.61	-	mJ
t <sub>d(on)</sub>	Turn-On Delay Time	V <sub>CC</sub> = 600 V, I <sub>C</sub> = 15 A, R <sub>G</sub> = 34 Ω, V <sub>GE</sub> = 15 V, Inductive Load, T <sub>C</sub> = 175°C	-	32	-	ns
t <sub>r</sub>	Rise Time		-	42	-	ns
t <sub>d(off)</sub>	Turn-Off Delay Time		-	510	-	ns
t <sub>f</sub>	Fall Time		-	24	-	ns
E <sub>on</sub>	Turn-On Switching Loss		-	1.86	-	mJ
E <sub>off</sub>	Turn-Off Switching Loss		-	0.70	-	mJ
E <sub>ts</sub>	Total Switching Loss		-	2.56	-	mJ
Q <sub>g</sub>	Total Gate Charge	V <sub>CE</sub> = 600 V, I <sub>C</sub> = 15 A, V <sub>GE</sub> = 15 V	-	128	-	nC
Q <sub>ge</sub>	Gate to Emitter Charge		-	11	-	nC
Q <sub>gc</sub>	Gate to Collector Charge		-	70	-	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	$I_F = 15\text{ A}, T_C = 25^\circ\text{C}$	-	2.8	3.7	V
		$I_F = 15\text{ A}, T_C = 175^\circ\text{C}$	-	2.3	-	V
$t_{rr}$	Diode Reverse Recovery Time	$V_R = 600\text{ V}, I_F = 15\text{ A},$ $di_F/dt = 200\text{ A/us}, T_C = 25^\circ\text{C}$	-	72	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	7.4	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	270	-	nC
$E_{rec}$	Reverse Recovery Energy	$V_R = 600\text{ V}, I_F = 15\text{ A},$ $di_F/dt = 200\text{ A/us}, T_C = 175^\circ\text{C}$	-	120	-	uJ
$t_{rr}$	Diode Reverse Recovery Time		-	183	-	ns
$I_{rr}$	Diode Peak Reverse Recovery Current		-	12	-	A
$Q_{rr}$	Diode Reverse Recovery Charge		-	1085	-	nC



## Typical Performance Characteristics

Figure 1. Typical Output Characteristics

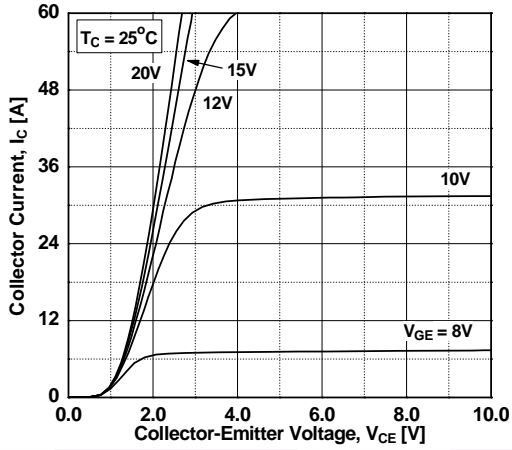


Figure 2. Typical Output Characteristics

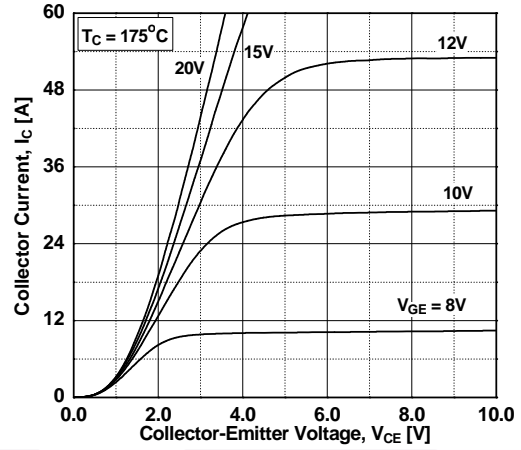


Figure 3. Typical Saturation Voltage Characteristics

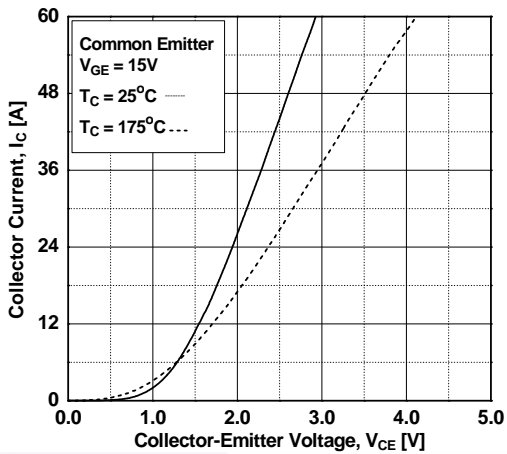


Figure 4. Saturation Voltage vs. Case Temperature at Variant Current Level

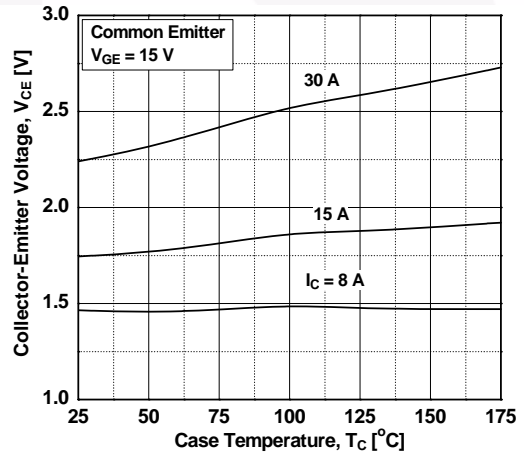


Figure 5. Saturation Voltage vs. Vge

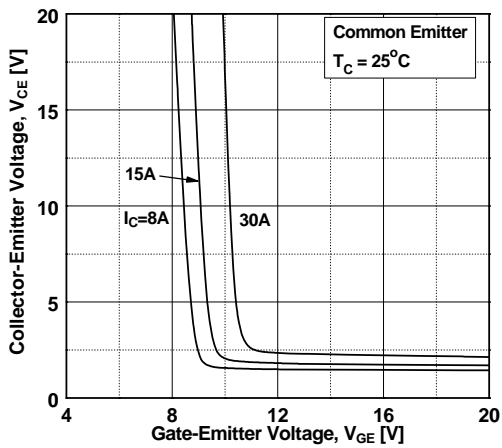
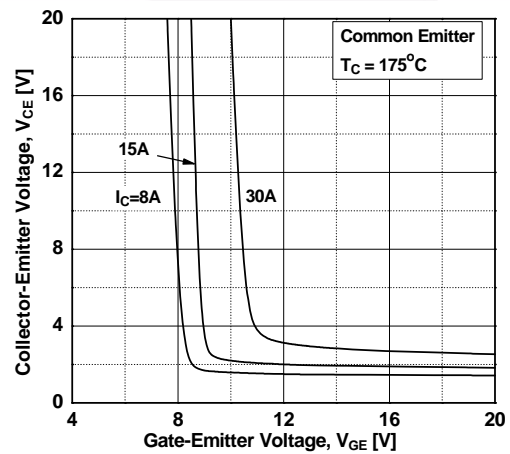


Figure 6. Saturation Voltage vs. Vge



## Typical Performance Characteristics

Figure 7. Capacitance Characteristics

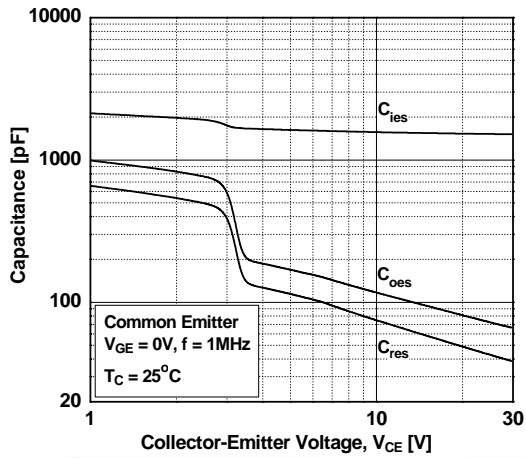


Figure 8. Gate Charge Characteristics

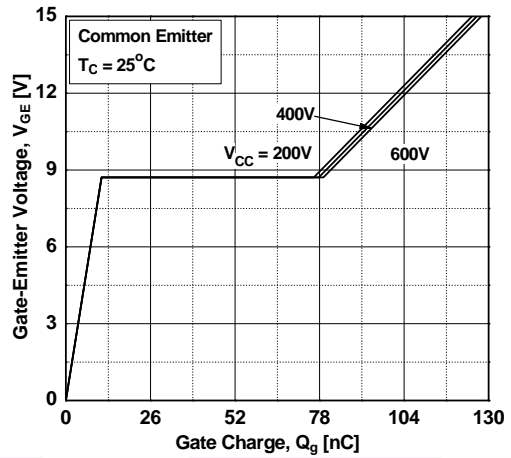


Figure 9. Turn-on Characteristics vs. Gate Resistance

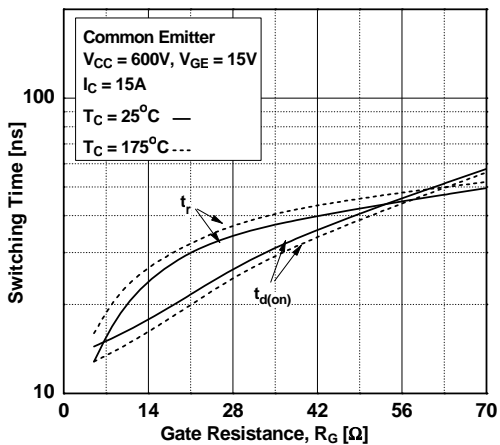


Figure 10. Turn-off Characteristics vs. Gate Resistance

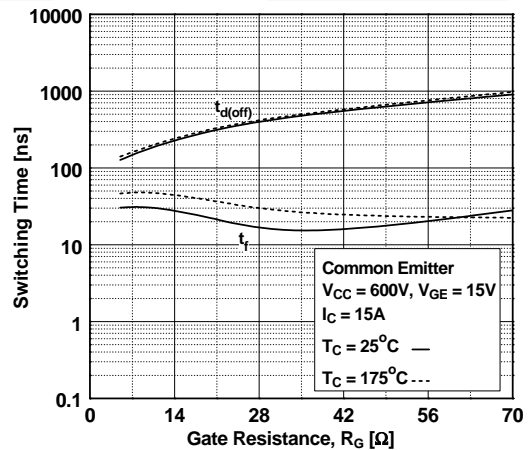


Figure 11. Switching Loss vs. Gate Resistance

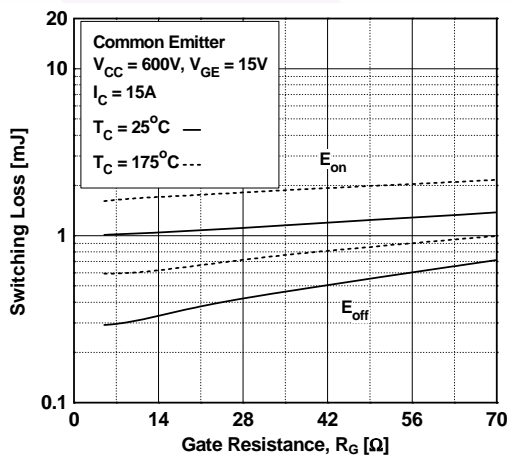
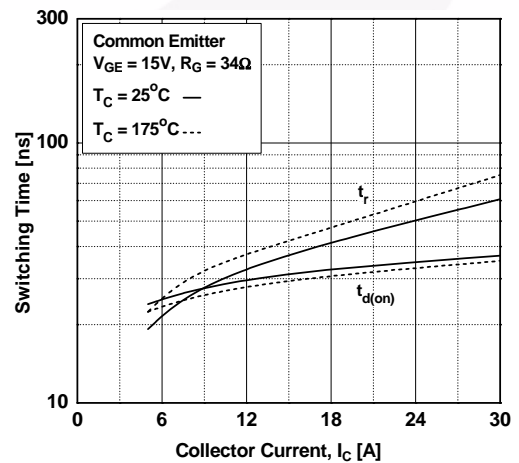


Figure 12. Turn-on Characteristics vs. Collector Current



## Typical Performance Characteristics

Figure 13. Turn-off Characteristics vs. Collector Current

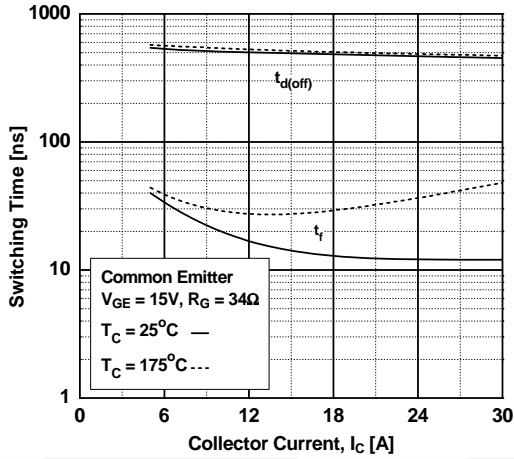


Figure 14. Switching Loss vs. Collector Current

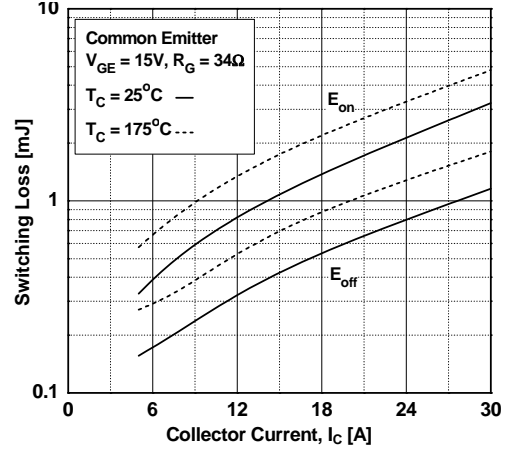


Figure 15. Load Current vs. Frequency

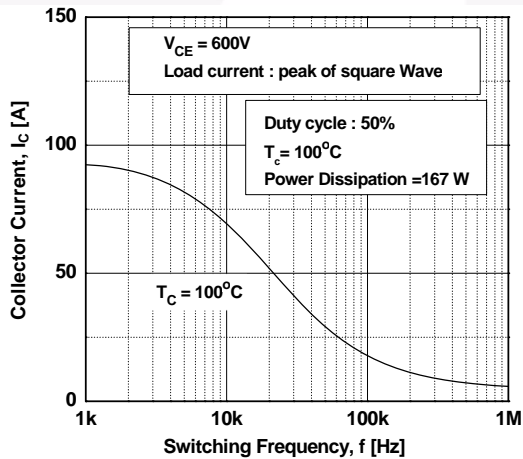


Figure 16. SOA Characteristics

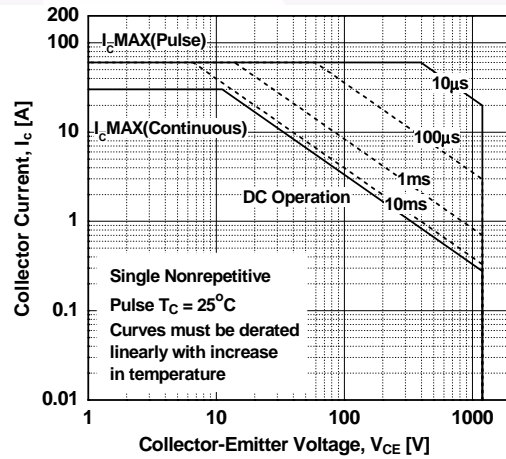


Figure 17. Forward Characteristics

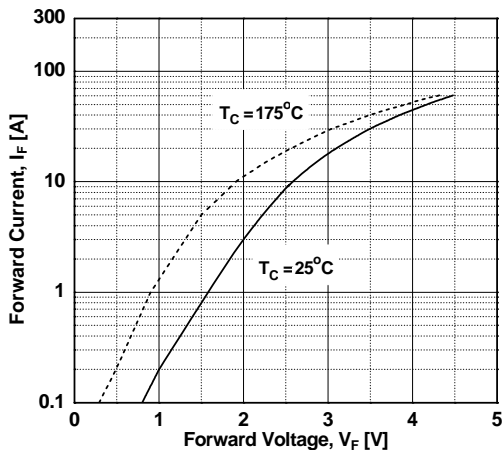
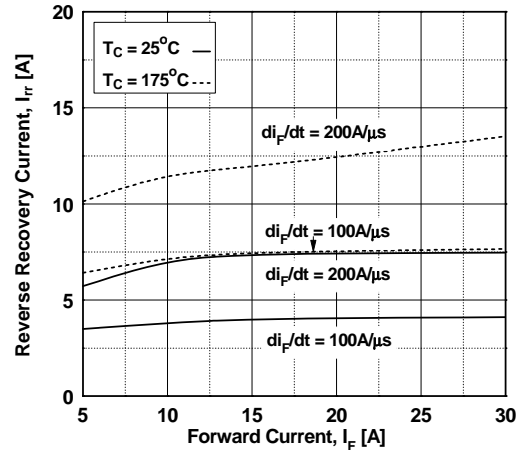


Figure 18. Reverse Recovery Current



## Typical Performance Characteristics

Figure 19. Reverse Recovery Time

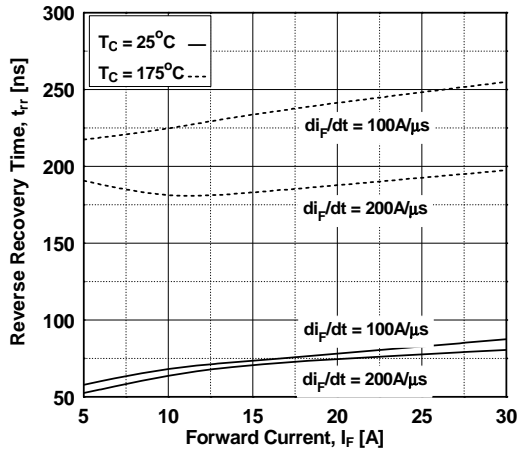


Figure 20. Stored Charge

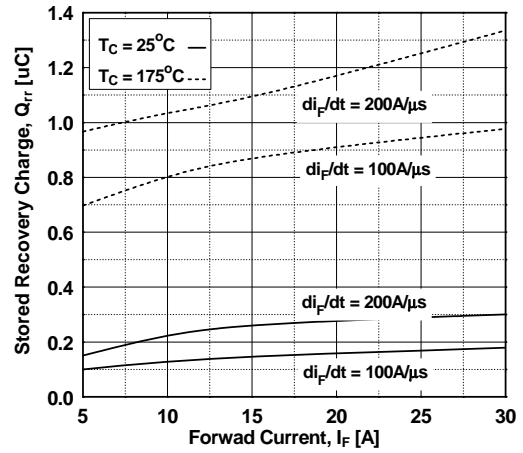


Figure 21. Transient Thermal Impedance of IGBT

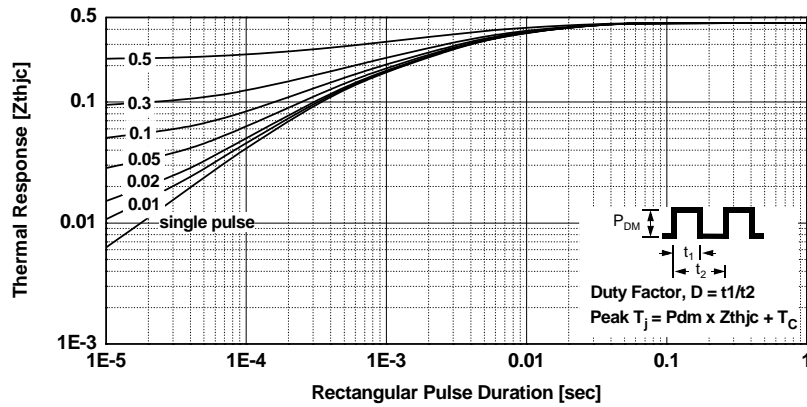
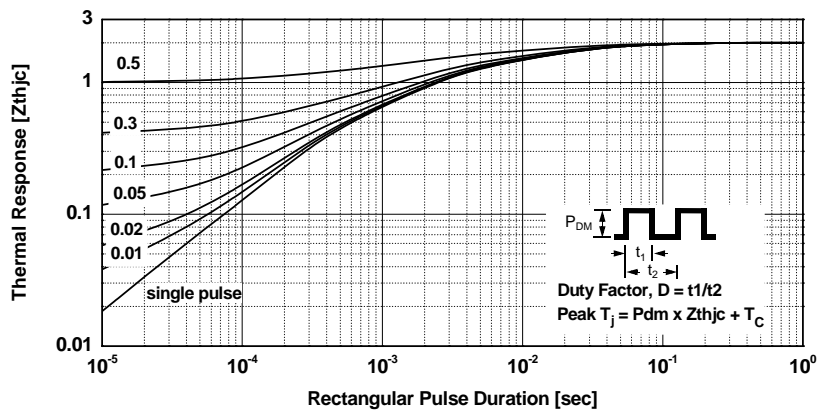
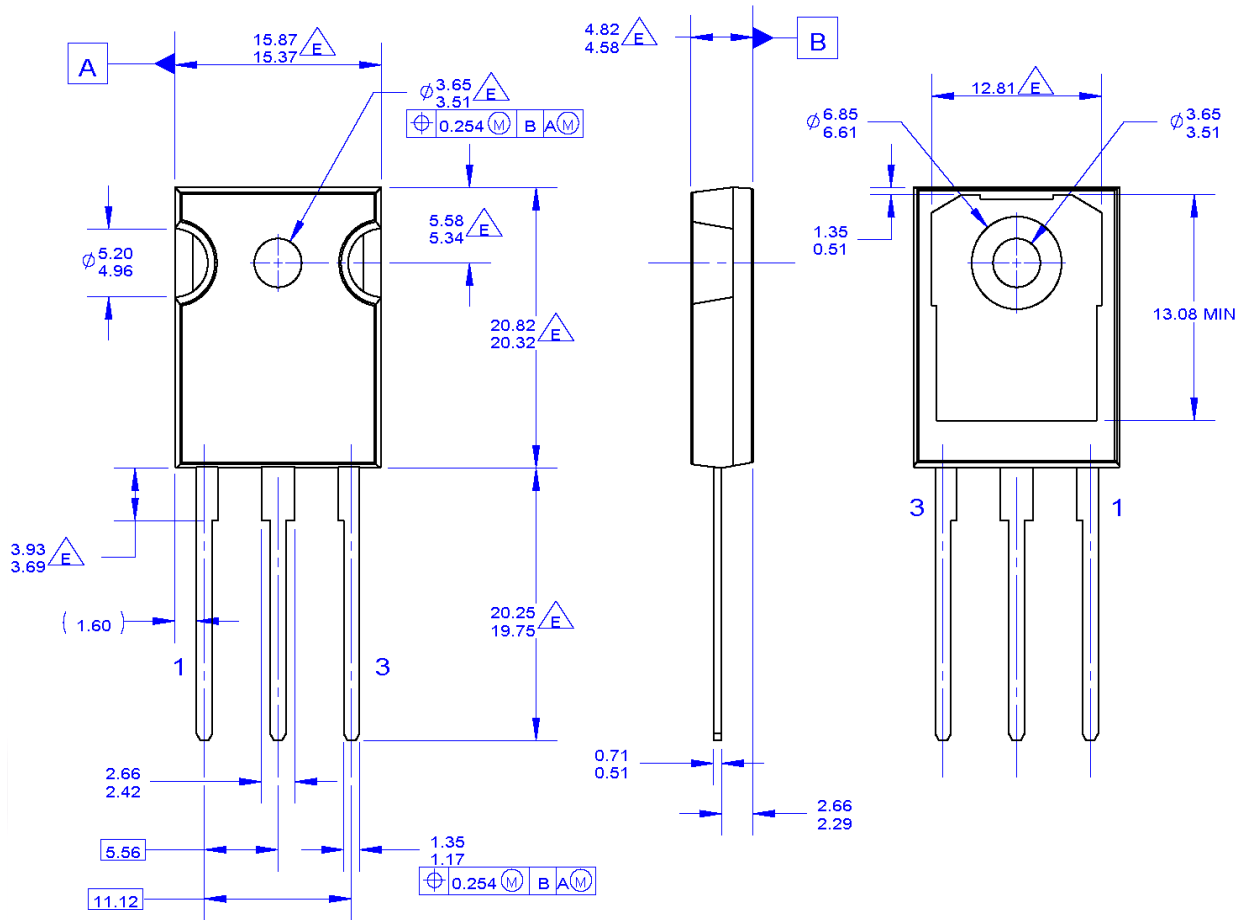


Figure 22. Transient Thermal Impedance of Diode





**Mechanical Dimensions**



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- DOES NOT COMPLY JEDEC STANDARD VALUE
- F. DRAWING FILENAME: MKT-TO247G03\_REV01

**Figure 23. TO-247, MOLDED, 3 LEAD, JEDEC AB LONG LEADS (Active)**

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Dimensions in Millimeters



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| Build it Now™   | GreenBridge™                                    | QFET®                      | TinyBuck™   |
| CorePLUS™   | Green FPS™                                      | QS™                        | TinyCalc™   |
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Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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