DGTD65T40S2PT

650V FIELD STOP IGBT IN TO247 (Type MC)

Description

The DGTD65T40S2PT is produced using advanced Field Stop Trench IGBT Technology, which provides excellent quality and high switching performance.

Features

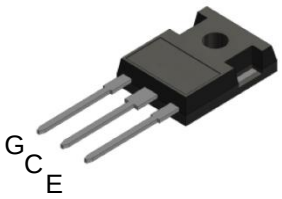
- High Speed Switching & Low Power Loss
- $V_{CE(SAT)}$ = 1.8V @ I_C = 40A
- t_{RR} = 60ns (Typ) @ di_F/dt = 820A/µs
- E_{OFF} = 0.4mJ @ T_C = +25°C
- Maximum Junction Temperature +175°C
- **Lead-Free Finish & RoHS Compliant (Notes 1 & 2)**
- **Halogen and Antimony Free. "Green" Device (Note 3)**

Applications

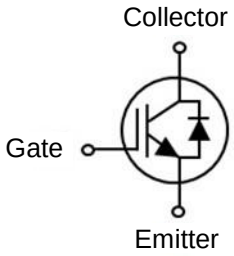
- UPS
- Welder
- Solar Inverter
- IH Cooker

Mechanical Data

- Case: TO247 (Type MC)
- Case Material: Molded Plastic. "Green" Molding Compound. UL Flammability Classification Rating 94V-0
- Terminals: Finish – Matte Tin Plated Leads. Solderable per MIL-STD-202, Method 208 e3
- Weight: 5.6 grams (Approximate)



TO247 (Type MC)



Device Symbol

Ordering Information (Note 4)

Part Number	Marking	Quantity
DGTD65T40S2PT	DGTD65T40S2	450 per Box in Tubes (Note 5)

Notes:
1. EU Directive 2002/95/EC (RoHS), 2011/65/EU (RoHS 2) & 2015/863/EU (RoHS 3) compliant. All applicable RoHS exemptions applied.
2. See https://www.diodes.com/quality/lead-free/ for more information about Diodes Incorporated's definitions of Halogen- and Antimony-free, "Green" and Lead-free.
3. Halogen- and Antimony-free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
4. For packaging details, go to our website at https://www.diodes.com/design/support/packaging/diodes-packaging/.
5. 30 Devices per Tube.

Marking Information

= Manufacturer's Marking
DGTD65T40S2 = Product Type Marking Code
YY = Year (ex: 18 = 2018)
LLLLL = Lot Code
WW = Week (01 to 53)

Absolute Maximum Ratings (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Collector-Emitter Voltage		V_{CE}	650	V
DC Collector Current, Limited by T_{Jmax}	T_C = +25°C	I_C	80	A
	T_C = +100°C		40	A
Pulsed Collector Current, t_p Limited by T_{Jmax}		I_{Cpuls}	120	A
Diode Forward Current Limited by T_{Jmax}	T_C = +25°C	I_F	40	A
	T_C = +100°C		20	A
Diode Pulsed Current, t_p Limited by T_{Jmax}		I_{Fpuls}	120	A
Gate-Emitter Voltage		V_{GE}	±20	V

Thermal Characteristics (@T_A = +25°C, unless otherwise specified.)

Characteristic		Symbol	Value	Unit
Power Dissipation Linear Derating Factor (Note 6)	T_C = +25°C	P_D	230	W
	T_C = +100°C		115	
Thermal Resistance, Junction to Ambient (Note 6)		$R_{\theta JA}$	40	°C/W
Thermal Resistance, Junction to Case for IBGT (Note 6)		$R_{\theta JC}$	0.65	
Thermal Resistance, Junction to Case for Diode (Note 6)		$R_{\theta JC}$	1.75	
Operating Temperature		T_J	-40 to +175	°C
Storage Temperature Range		T_{STG}	-55 to +150	

Note: 6. When mounted on a standard JEDEC 2-layer FR-4 board.

Electrical Characteristics (@T_J = +25°C, unless otherwise specified.)

Parameter		Symbol	Min	Typ	Max	Unit	Condition
STATIC CHARACTERISTICS							
Collector-Emitter Breakdown Voltage		BV_{CES}	650	—	—	V	I_C = 2mA, V_{GE} = 0V
Collector-Emitter Saturation Voltage	T_J = +25°C	$V_{CE(SAT)}$	—	1.8	2.30	V	I_C = 40A, V_{GE} = 15V
	T_J = +175°C		—	2.30	—		
Diode Forward Voltage	T_J = +25°C	V_F	—	1.50	1.95	V	V_{GE} = 0V, I_F = 20A
	T_J= +175°C		—	1.50	—		
Gate-Emitter Threshold Voltage		$V_{GE(TH)}$	3.5	5.0	6.5	V	V_{CE} = V_{GE}, I_C = 40mA
Zero Gate Voltage Collector Current		I_{CES}	—	—	40	μA	V_{CE} = 650V, V_{GE} = 0V
Gate-Emitter Leakage Current		I_{GES}	—	—	±100	nA	V_{GE} = 20V, V_{CE} = 0V
DYNAMIC CHARACTERISTICS							
Total Gate Charge		Q_g	—	60	—	nC	V_{CE} = 520V, I_C = 40A, V_{GE} = 15V
Gate-Emitter Charge		Q_{ge}	—	13	—		
Gate-Collector Charge		Q_{gc}	—	25	—		
Input Capacitance		C_{ies}	—	1565	—	pF	V_{CE} = 25V, V_{GE} = 0V, f = 1MHz
Reverse Transfer Capacitance		C_{res}	—	37	—		
Output Capacitance		C_{oes}	—	120	—		
SWITCHING CHARACTERISTICS							
Turn-on Delay Time		$t_{D(ON)}$	—	6	—	ns	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 10Ω, Inductive Load, T_{VJ} = +25°C
Rise Time		t_R	—	36	—		
Turn-off Delay Time		$t_{D(OFF)}$	—	55	—		
Fall Time		t_F	—	64	—		
Turn-on Switching Energy		E_{ON}	—	0.5	—	mJ	
Turn-off Switching Energy		E_{OFF}	—	0.4	—		
Total Switching Energy		E_{TS}	—	0.9	—		
Reverse Recovery Time		t_{RR}	—	60	—	ns	I_F = 20A, di_F/dt = 820A/μs, T_{VJ} = +25°C
Reverse Recovery Current		I_{RR}	—	18	—	A	
Reverse Recovery Charge		Q_{RR}	—	696	—	nC	
Turn-on Delay Time		$t_{D(ON)}$	—	7	—	ns	V_{GE} = 15V, V_{CC} = 400V, I_C = 40A, R_G = 10Ω , Inductive Load, T_{VJ} = +175°C
Rise Time		t_R	—	41	—		
Turn-off Delay Time		$t_{D(OFF)}$	—	60	—		
Fall Time		t_F	—	102	—		
Turn-on Switching Energy		E_{ON}	—	1.04	—	mJ	
Turn-off Switching Energy		E_{OFF}	—	0.57	—		
Total Switching Energy		E_{TS}	—	1.61	—		
Reverse Recovery Time		t_{RR}	—	72	—	ns	I_F = 20A, di_F/dt = 820A/μs, T_{VJ} = +175°C
Reverse Recovery Current		I_{RR}	—	22	—	A	
Reverse Recovery Charge		Q_{RR}	—	864	—	nC	

Typical Performance Characteristics (@T_A = +25°C, unless otherwise specified.)

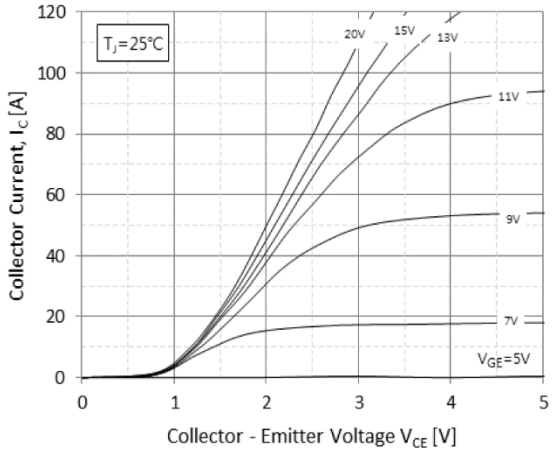


Fig.1 Typical Output Characteristics(T_J=25℃)

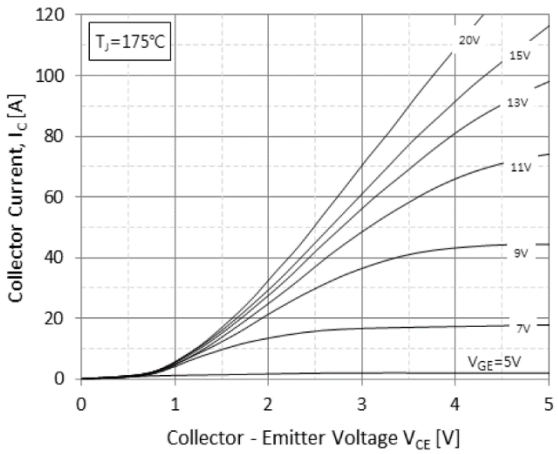


Fig.2 Typical Output Characteristics(T_J=175℃)

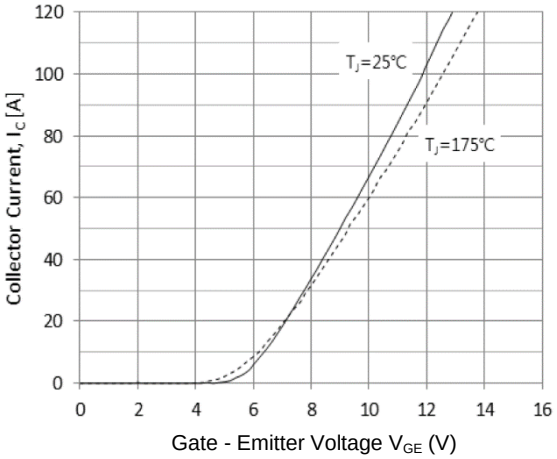


Fig.3 Typical Transfer Characteristics

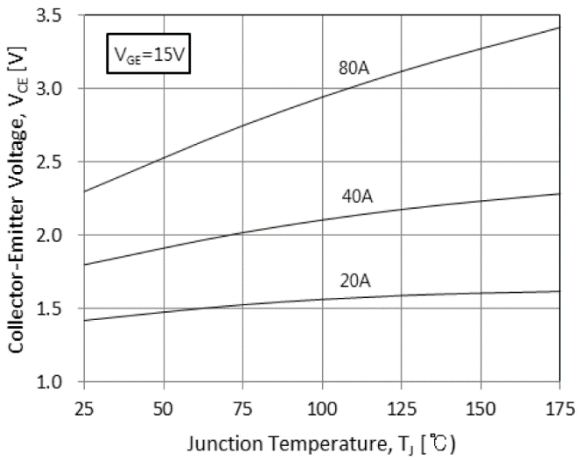


Fig.4 Typical Collector-Emitter Saturation Voltage -Junction Temperature

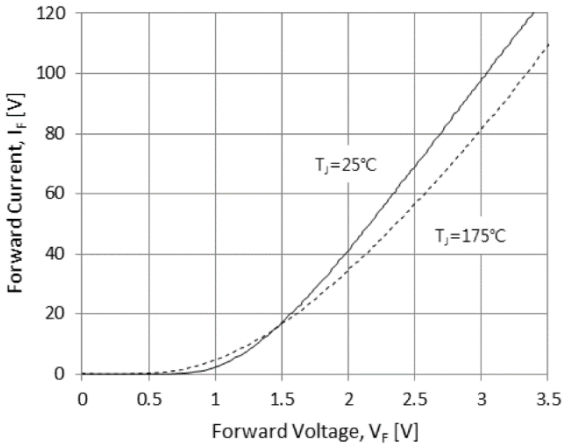


Fig.5 Diode Forward Characteristics

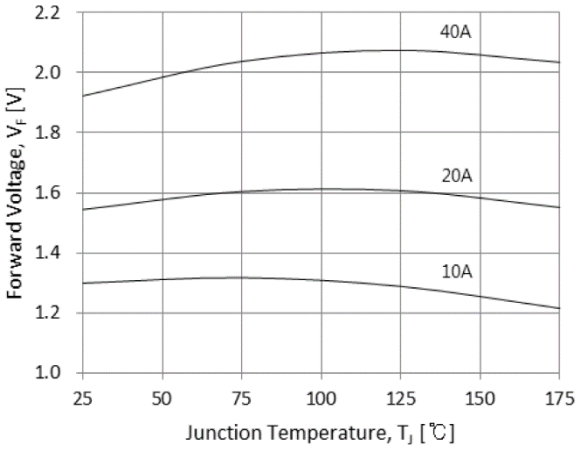


Fig.6 Diode Forward-Junction Temperature

Typical Performance Characteristics (Cont.)

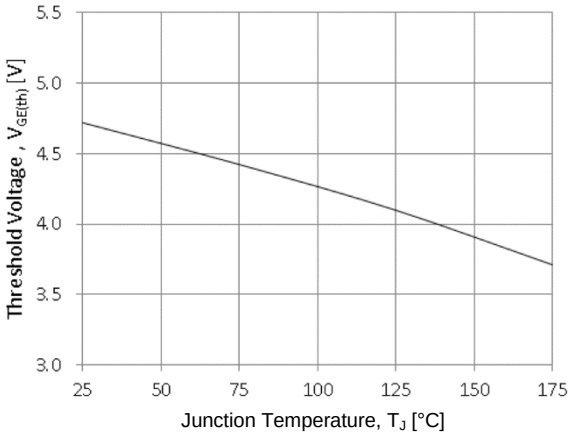


Fig.7 Threshold Voltage-Junction Temperature

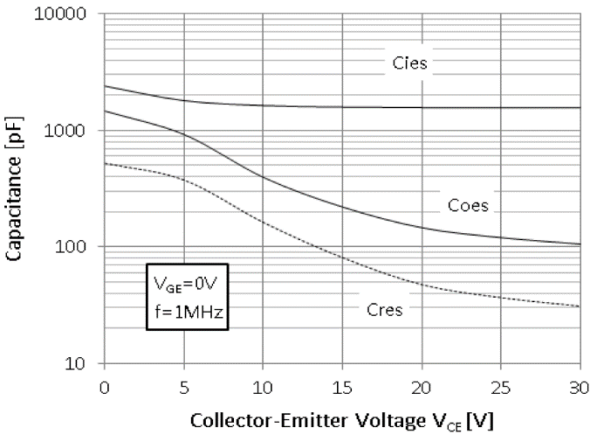


Fig.8 Typical Capacitance

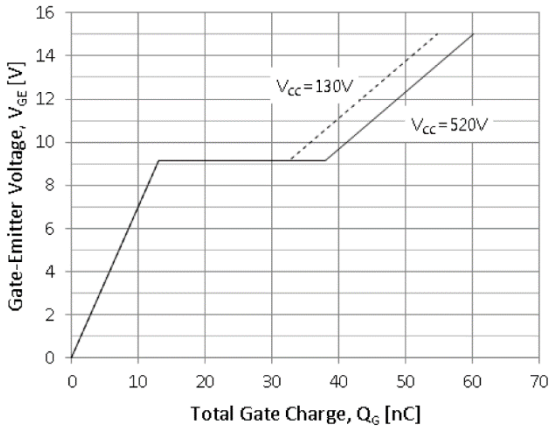


Fig.9 Typical Gate Charge

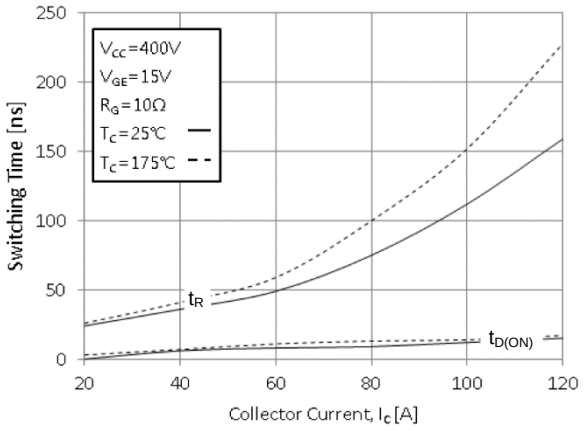


Fig.10 Typical Turn on-Collector Current

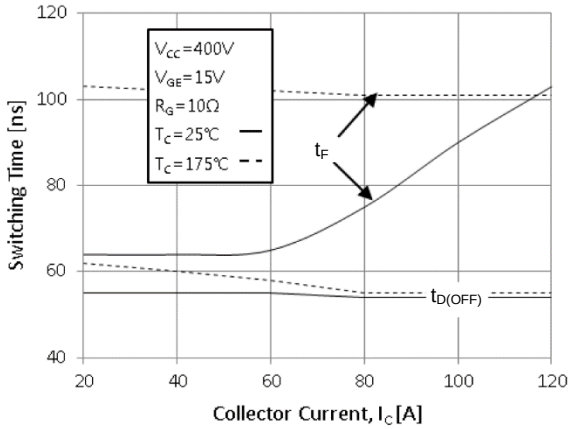


Fig.11 Typical Turn off-Collector Current

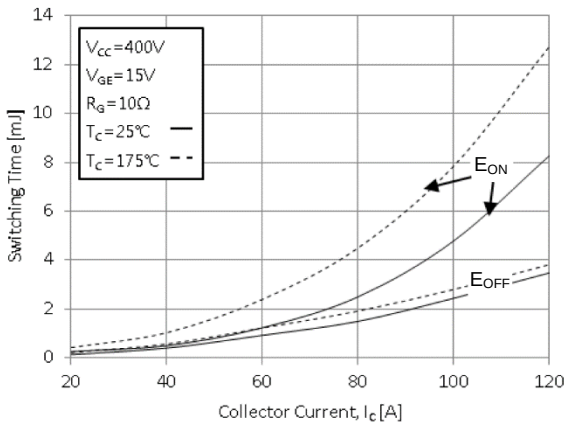


Fig.12 Switching Loss-Collector Current

Typical Performance Characteristics (Cont.)

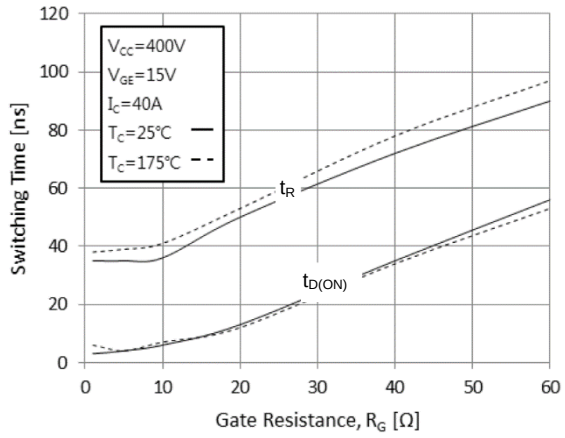


Fig.13 Turn on Characteristics-Gate Resistance

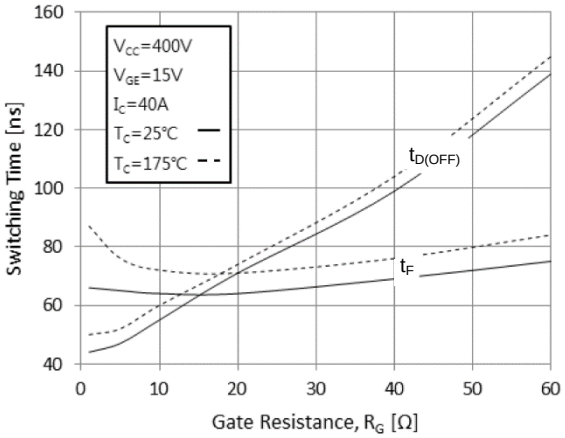


Fig.14 Turn off Characteristics-Gate Resistance

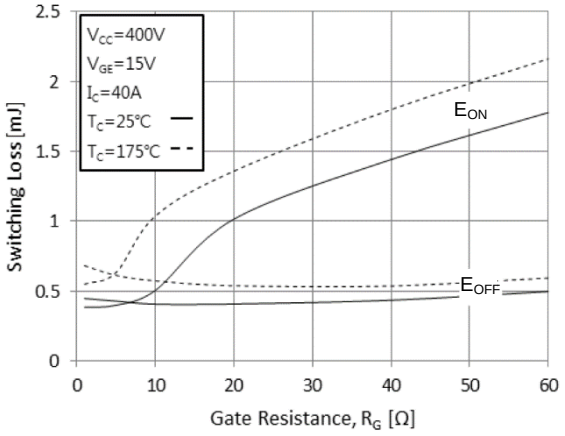


Fig.15 Switching Loss-Gate Resistance

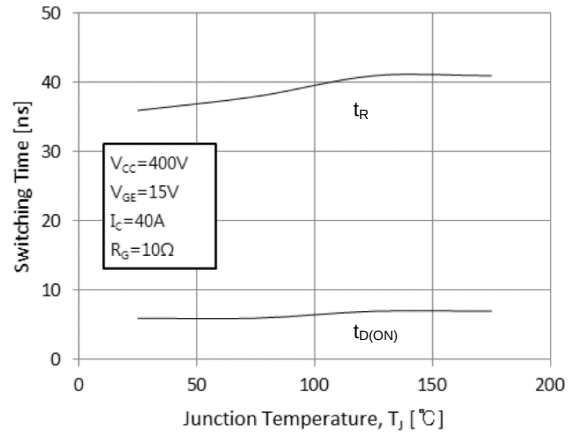


Fig.16 Turn on Characteristics-Junction Temperature

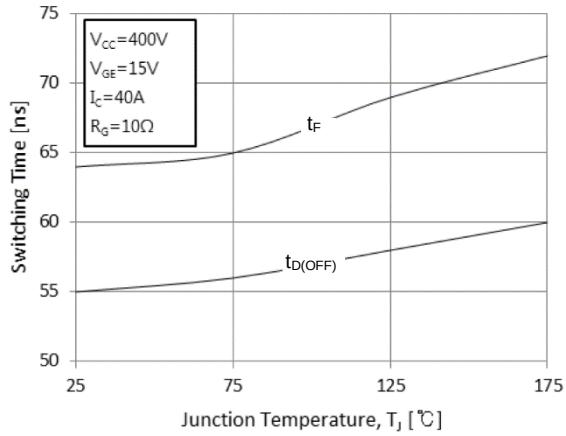


Fig.17 Turn off Characteristics-Junction Temperature

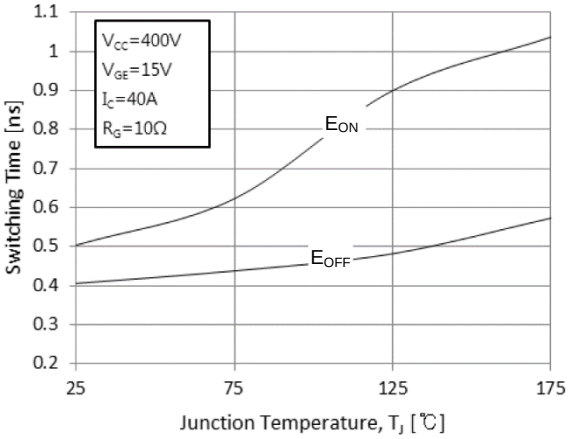


Fig.18 Switching Loss-Junction Temperature

Typical Performance Characteristics (Cont.)

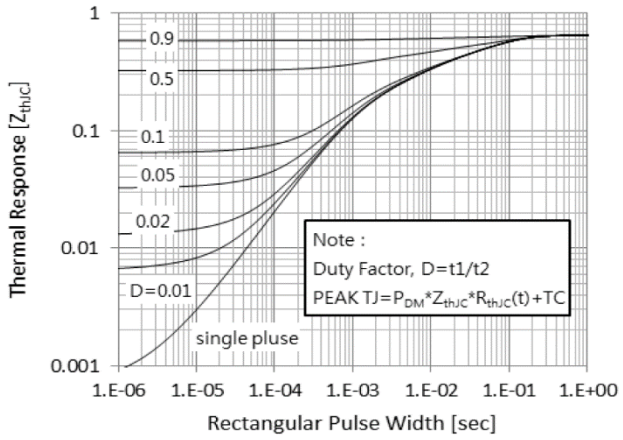


Fig.19 IGBT Transient Thermal Impedance

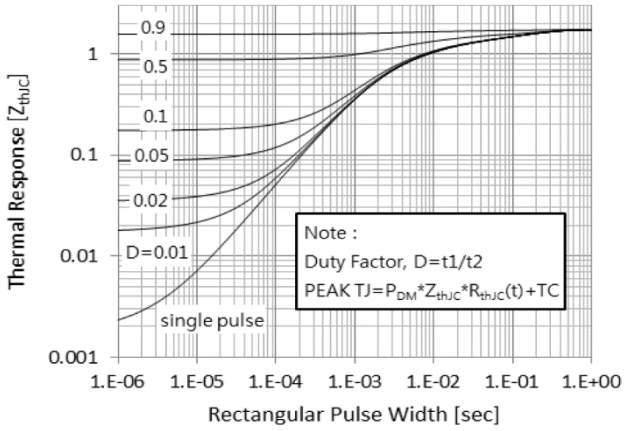
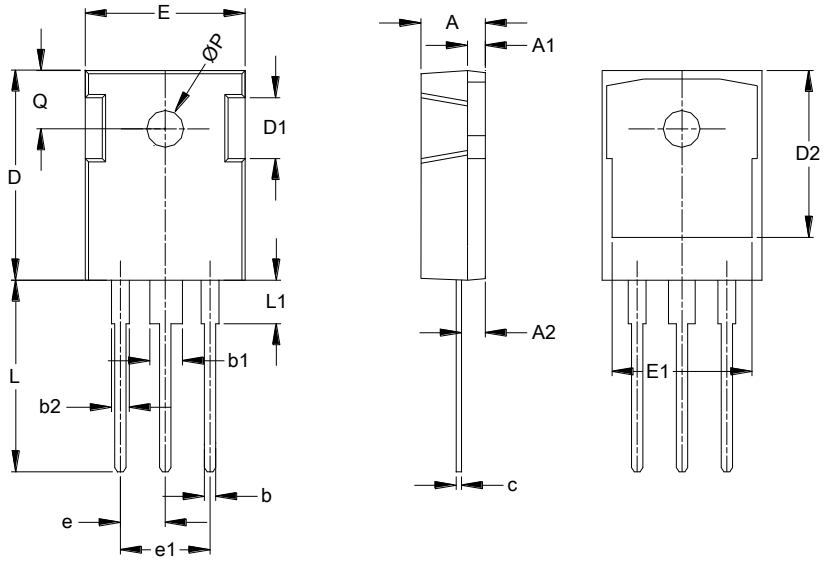


Fig.20 FRD Transient Thermal Impedance

Package Outline Dimensions

Please see http://www.diodes.com/package-outlines.html for the latest version.

TO247 (Type MC)



TO247 (Type MC)			
Dim	**Min**	**Max**	**Typ**
A	4.700	5.310	-
A1	1.500	2.490	-
A2	2.200	2.600	-
b	0.990	1.400	-
b1	2.590	3.430	-
b2	1.650	2.390	-
c	0.380	0.890	-
D	20.30	21.46	-
D1	4.320	5.490	-
D2	13.08	-	-
E	15.45	16.26	-
E1	13.06	14.02	-
e	5.450		
e1	10.90		
L	19.81	20.57	-
L1	-	4.500	-
Q	5.380	6.200	-
øP	3.500	3.700	-
All Dimensions in mm			

Note : For high-voltage applications, the appropriate industry sector guidelines should be considered with regards to creepage and clearance distances between device Terminals and PCB tracking.

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