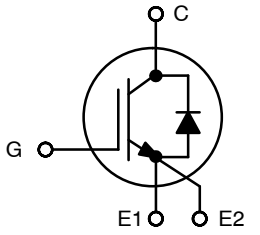
Field Stop Trench IGBT
650 V, 75 A

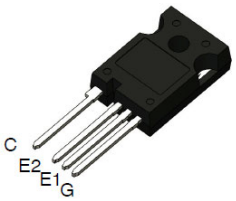
FGHL75T65MQDTL4

75 A, 650 V
V_{CESat} = 1.45 V

Field stop 4th generation mid speed IGBT technology Full current rated copack Diode technology.



E1: Kelvin Emitter
E2: Power Emitter



TO−247−4LD
CASE 340CJ

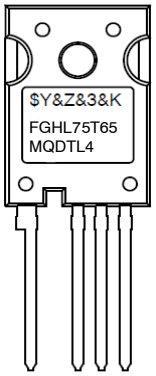
Features

- Maximum Junction Temperature: T_J = 175°C
- Positive Temperature Co−efficient for Easy Parallel Operating
- High Current Capability
- Low Saturation Voltage: $V_{CE(Sat)}$ = 1.45 V (Typ.) @ I_C = 75 A
- 100% of the Parts are Tested for I_{LM} (Note 2)
- Smooth and Optimized Switching
- Tight Parameter Distribution
- RoHS Compliant

Typical Applications

- Solar Inverter
- UPS, ESS
- PFC, Converters

MARKING DIAGRAM



&Y = ON Semiconductor Logo
&Z = Assembly Plant Code
&3 = 3−Digit Date Code
&K = 2−Digit Lot Traceability Code
FGHL75T65MQDTL4 = Specific Device Code

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector to Emitter Voltage	V_{CES}	650	V
Gate to Emitter Voltage Transient Gate to Emitter Voltage	V_{GES}	±20 ±30	V
Collector Current (Note 1) @ T_C = 25°C @ T_C = 100°C	I_C	80 75	A
Pulsed Collector Current (Note 2)	I_{LM}	300	A
Pulsed Collector Current (Note 3)	I_{CM}	300	A
Diode Forward Current (Note 1) @ T_C = 25°C @ T_C = 100°C	I_F	80 75	A
Pulsed Diode Maximum Forward Current	I_{FM}	300	A
Maximum Power Dissipation @ T_C = 25°C @ T_C = 100°C	P_D	375 188	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	−55 to +175	°C
Maximum Lead Temp. for Soldering Purposes (1/8″ from Case for 5 s)	T_L	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Value limit by bond wire
2. V_{CC} = 400 V, V_{GE} = 15 V, I_C = 300 A, Inductive Load, 100% tested
3. Repetitive rating: Pulse width limited by max. junction temperature

ORDERING INFORMATION

Device	Package	Shipping
FGHL75T65MQDTL4	TO−247−4LD	30 Units / Tube

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THERMAL CHARACTERISTICS

Rating	Symbol	Value	Unit
Thermal Resistance Junction−to−case, for IGBT	$R_{\theta JC}$	0.40	°C/W
Thermal Resistance Junction−to−case, for Diode	$R_{\theta JC}$	0.60	°C/W
Thermal Resistance Junction−to−ambient	$R_{\theta JA}$	40	°C/W

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS							
Collector−emitter Breakdown Voltage, Gate−emitter Short−circuited	V_{GE} = 0 V, I_C = 1 mA		BV_{CES}	650	–	–	V
Temperature Coefficient of Breakdown Voltage	V_{GE} = 0 V, I_C = 1 mA		$\frac{\Delta BV_{CES}}{\Delta T_J}$	–	0.6	–	V/°C
Collector−emitter Cut−off Current, Gate−emitter Short−circuited	V_{GE} = 0 V, V_{CE} = 650 V		I_{CES}	–	–	250	μA
Gate Leakage Current, Collector−emitter Short−circuited	V_{GE} = 20 V, V_{CE} = 0 V		I_{GES}	–	–	±400	nA
ON CHARACTERISTICS							
Gate−emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 75 mA		$V_{GE(th)}$	3.0	4.5	6.0	V
Collector−emitter Saturation Voltage	V_{GE} = 15 V, I_C = 75 A,	T_J = 25°C	$V_{CE(sat)}$	–	1.45	1.8	V
		T_J = 175°C		–	1.65	–	V
DYNAMIC CHARACTERISTICS							
Input Capacitance	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz		C_{ies}	–	4954	–	pF
Output Capacitance			C_{oes}	–	163	–	
Reverse Transfer Capacitance			C_{res}	–	14	–	
Gate Charge Total	V_{CE} = 400 V, I_C = 75 A, V_{GE} = 15 V		Q_g	–	149	–	nC
Gate−to−emitter Charge			Q_{ge}	–	27	–	
Gate−to−collector Charge			Q_{gc}	–	34	–	
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD							
Turn−on Delay Time	T_C = 25°C, V_{CC} = 400 V, I_C = 37.5 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load		$t_{d(on)}$	–	30	–	ns
Rise Time			t_r	–	16	–	
Turn−off Delay Time			$t_{d(off)}$	–	190	–	
Fall Time			t_f	–	35	–	
Turn−on Switching Loss			E_{on}	–	0.6	–	mJ
Turn−off Switching Loss			E_{off}	–	0.5	–	
Total Switching Loss			E_{ts}	–	1.1	–	
Turn−on Delay Time	T_C = 25°C, V_{CC} = 400 V, I_C = 75 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load		$t_{d(on)}$	–	32	–	ns
Rise Time			t_r	–	29	–	
Turn−off Delay Time			$t_{d(off)}$	–	181	–	
Fall Time			t_f	–	32	–	
Turn−on Switching Loss			E_{on}	–	1.2	–	mJ
Turn−off Switching Loss			E_{off}	–	1.1	–	
Total Switching Loss			E_{ts}	–	2.3	–	

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted) (continued)

Parameter	Test Conditions		Symbol	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS, INDUCTIVE LOAD							
Turn−on Delay Time	T_C = 150°C, V_{CC} = 400 V, I_C = 37.5 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load		$t_{d(on)}$	−	27	−	ns
Rise Time			t_r	−	19	−	
Turn−off Delay Time			$t_{d(off)}$	−	206	−	
Fall Time			t_f	−	44	−	
Turn−on Switching Loss			E_{on}	−	1.9	−	mJ
Turn−off Switching Loss			E_{off}	−	1.8	−	
TotaL Switching Loss			E_{ts}	−	3.7	−	
Turn−on Delay Time	T_C = 150°C, V_{CC} = 400 V, I_C = 75 A, R_G = 10 Ω, V_{GE} = 15 V, Inductive Load		$t_{d(on)}$	−	30	−	ns
Rise Time			t_r	−	32	−	
Turn−off Delay Time			$t_{d(off)}$	−	198	−	
Fall Time			t_f	−	40	−	
Turn−on Switching Loss			E_{on}	−	2.0	−	mJ
Turn−off Switching Loss			E_{off}	−	1.4	−	
Total Switching Loss			E_{ts}	−	3.4	−	
DIODE CHARACTERISTICS							
Diode Forward Voltage	I_F = 75 A	T_J = 25°C	V_{FM}	−	1.65	2.1	V
		T_J = 175°C		−	1.55	−	
DIODE SWITCHING CHARACTERISTICS, INDUCTIVE LOAD							
Reverse Recovery Energy	T_C = 25°C, V_{CE} = 400 V, I_F = 37.5 A, dI_F/dt = 1000 A/μs		E_{REC}	−	105	−	μJ
Diode Reverse Recovery Time			T_{rr}	−	58	−	ns
Diode Reverse Recovery Charge			Q_{rr}	−	591	−	nC
Reverse Recovery Energy	T_C = 25°C, V_{CE} = 400 V, I_F = 75 A, dI_F/dt = 1000 A/μs		E_{REC}	−	235	−	μJ
Diode Reverse Recovery Time			T_{rr}	−	107	−	ns
Diode Reverse Recovery Charge			Q_{rr}	−	1113	−	nC
Reverse Recovery Energy	T_C = 150°C, V_{CE} = 400 V, I_F = 37.5 A, dI_F/dt = 1000 A/μs		E_{REC}	−	747	−	μJ
Diode Reverse Recovery Time			T_{rr}	−	151	−	ns
Diode Reverse Recovery Charge			Q_{rr}	−	2780	−	nC
Reverse Recovery Energy	T_C = 150°C, V_{CE} = 400 V, I_F = 75 A, dI_F/dt = 1000 A/μs		E_{REC}	−	865	−	μJ
Diode Reverse Recovery Time			T_{rr}	−	171	−	ns
Diode Reverse Recovery Charge			Q_{rr}	−	3286	−	nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

TYPICAL CHARACTERISTICS

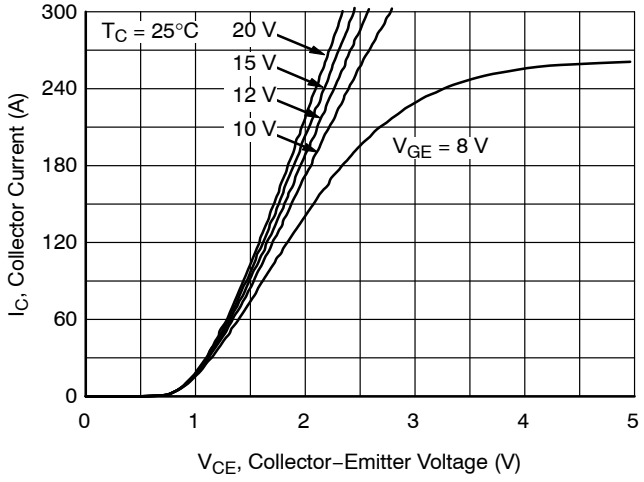


Figure 1. Typical Output Characteristics

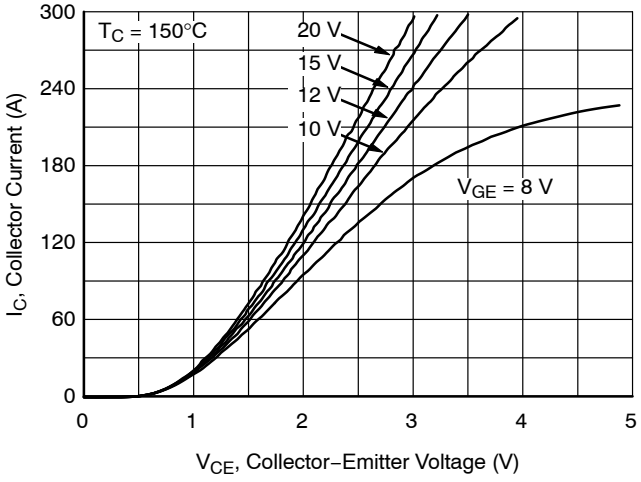


Figure 2. Typical Output Characteristics

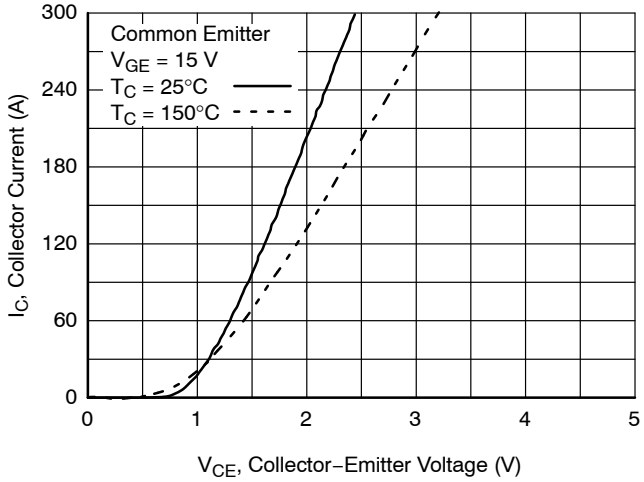


Figure 3. Typical Saturation Voltage

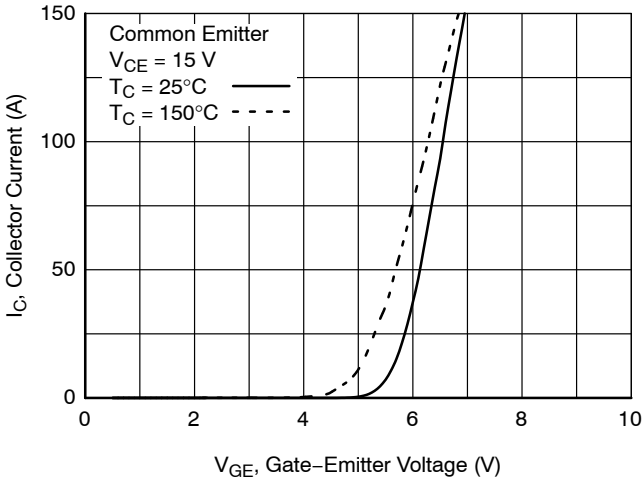


Figure 4. Typical Transfer Characteristics

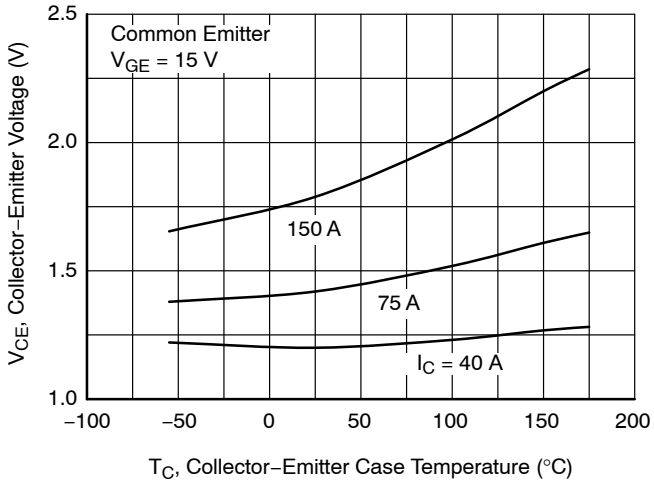


Figure 5. Saturation Voltage vs. Case Temperature

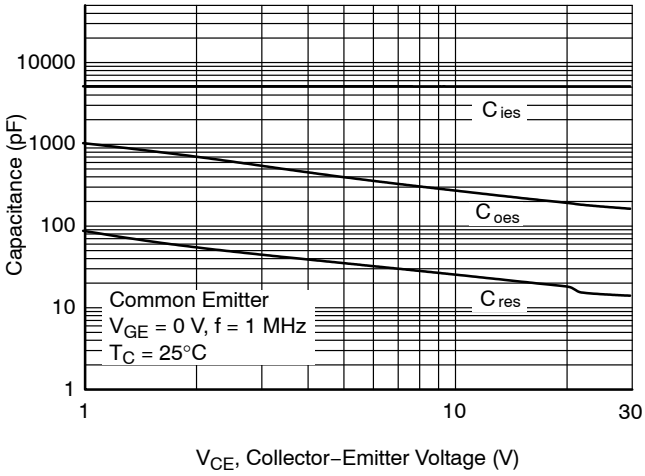


Figure 6. Capacitance Characteristics

TYPICAL CHARACTERISTICS (continued)

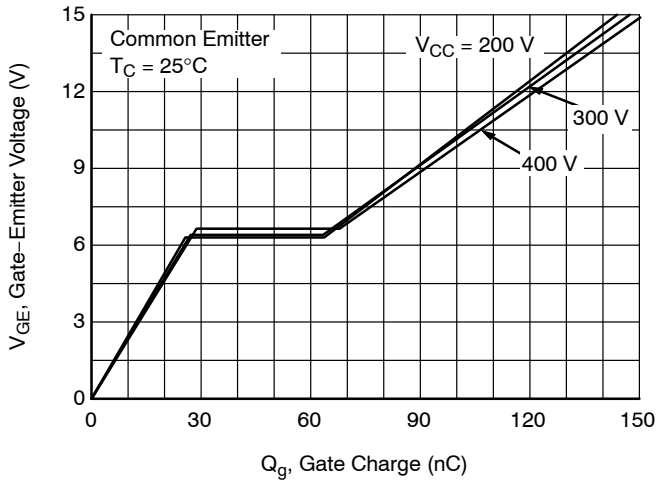


Figure 7. Gate Charge Characteristics

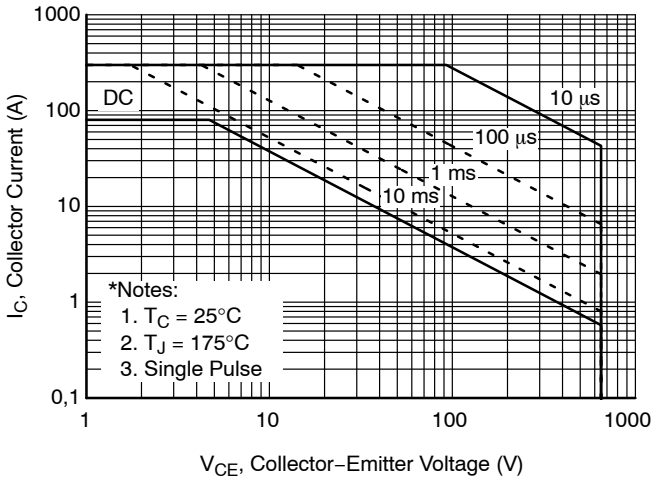


Figure 8. SOA Characteristics

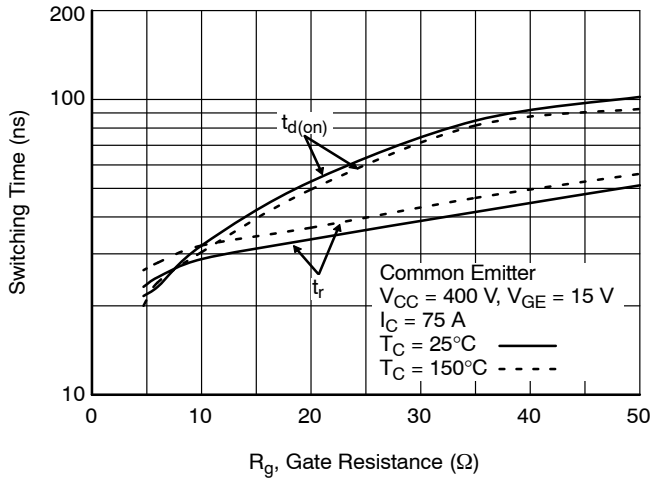


Figure 9. Turn−On Characteristics vs. Gate Resistance

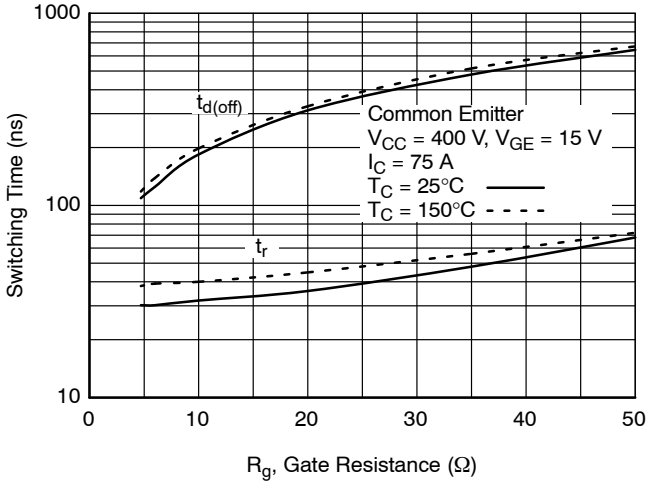


Figure 10. Turn−Off Characteristics vs. Gate Resistance

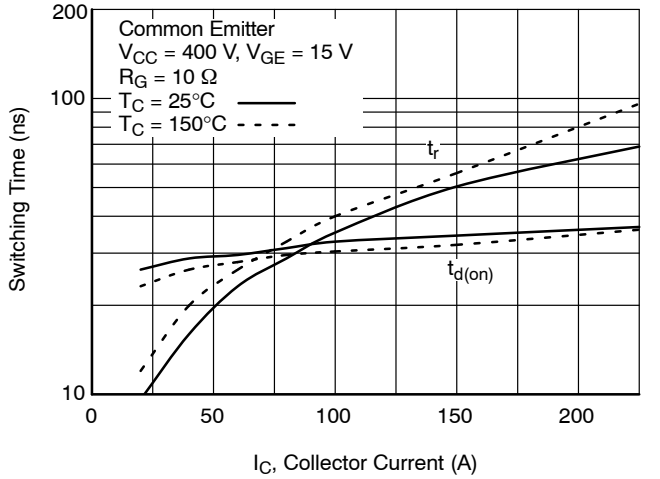


Figure 11. Turn−On Characteristics vs. Collector Current

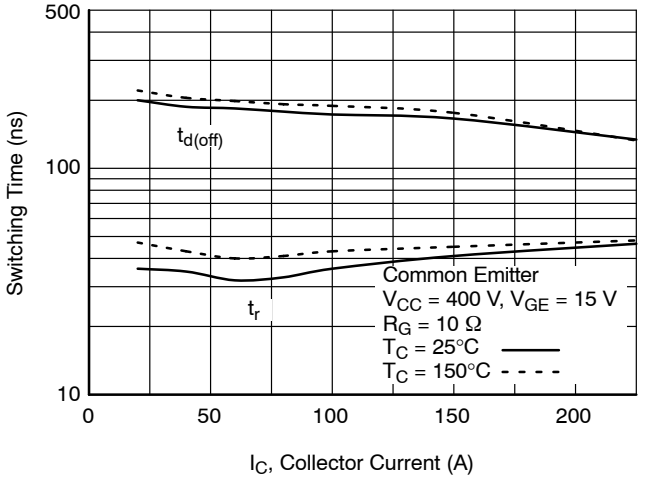


Figure 12. Turn−Off Characteristics vs. Collector Current

TYPICAL CHARACTERISTICS (continued)

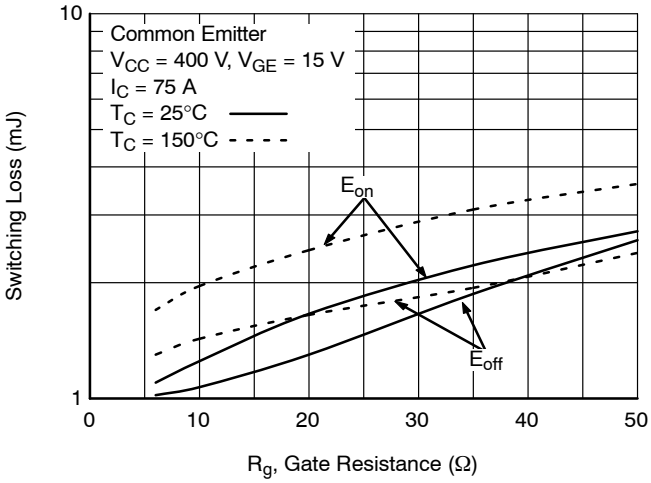


Figure 13. Switching Loss vs. Gate Resistance

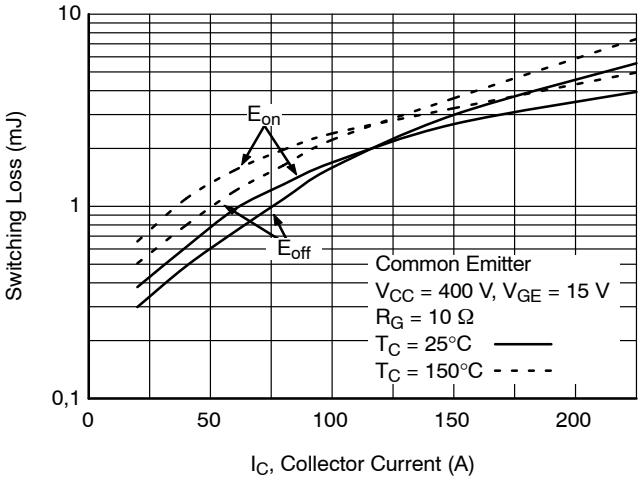


Figure 14. Switching Loss vs. Collector Current

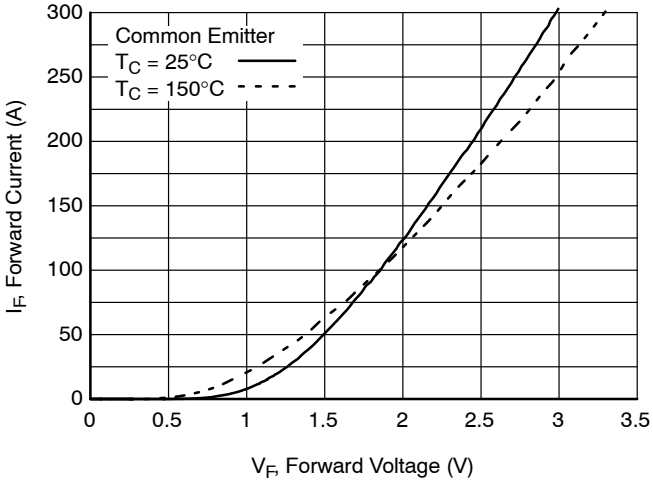


Figure 15. Forward Characteristics

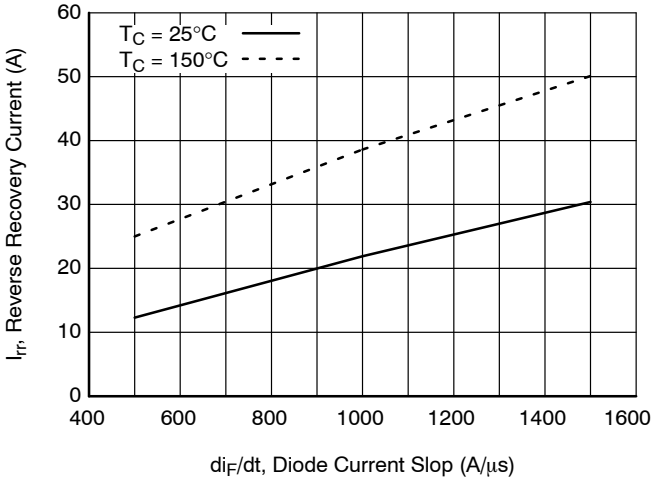


Figure 16. Reverse Recovery Current

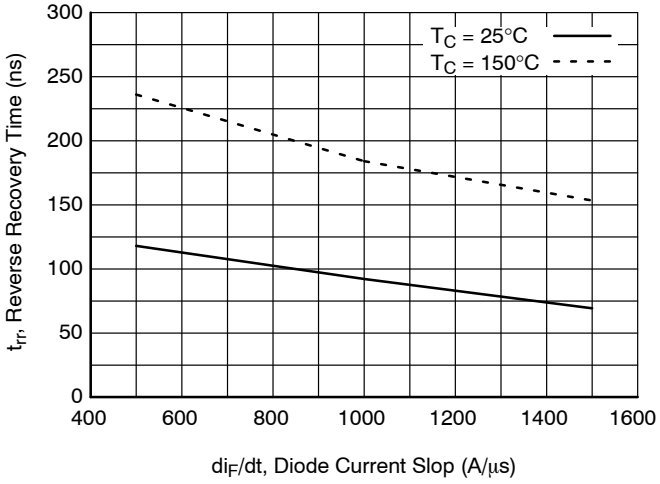


Figure 17. Reverse Recovery Time

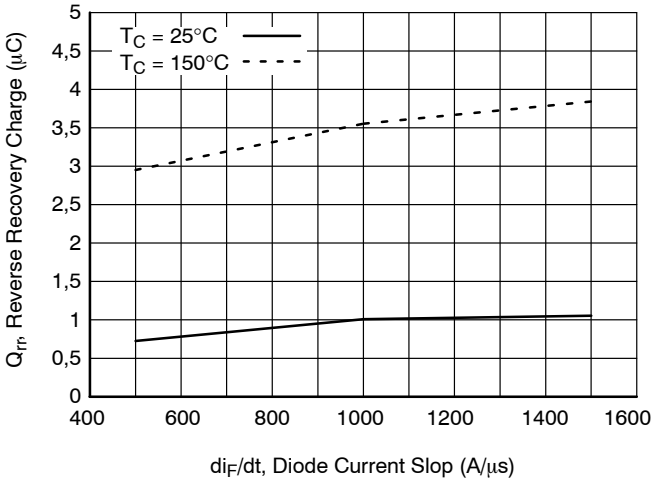


Figure 18. Stored Charge

TYPICAL CHARACTERISTICS (continued)

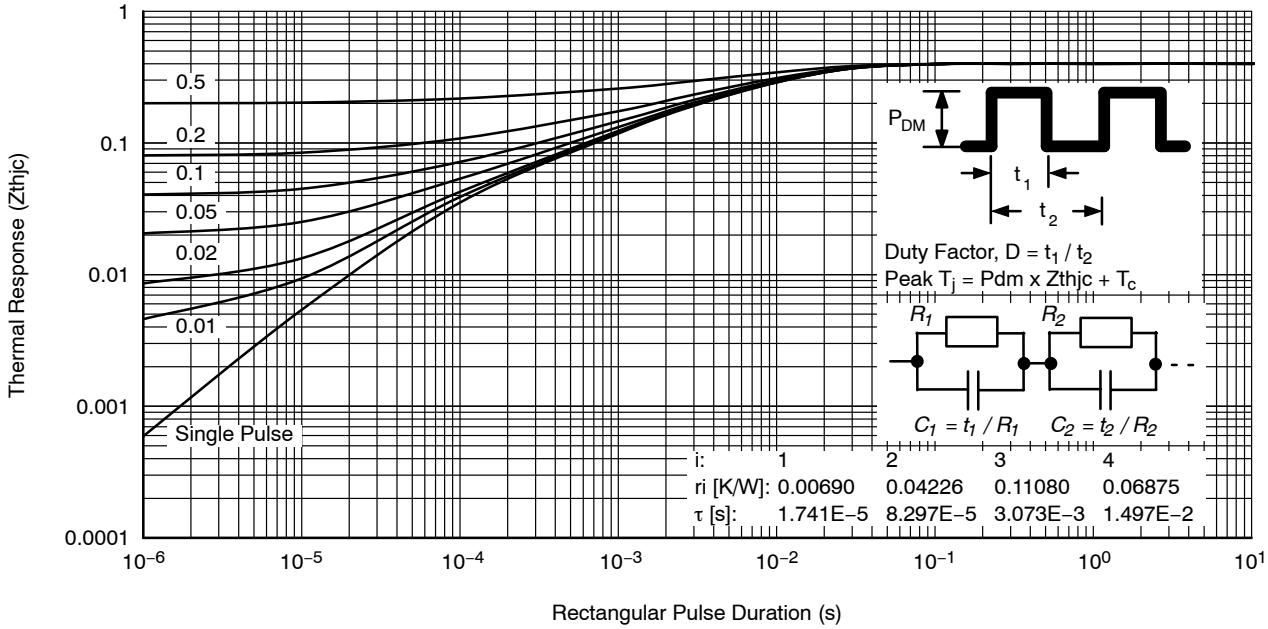


Figure 19. Transient Thermal Impedance of IGBT

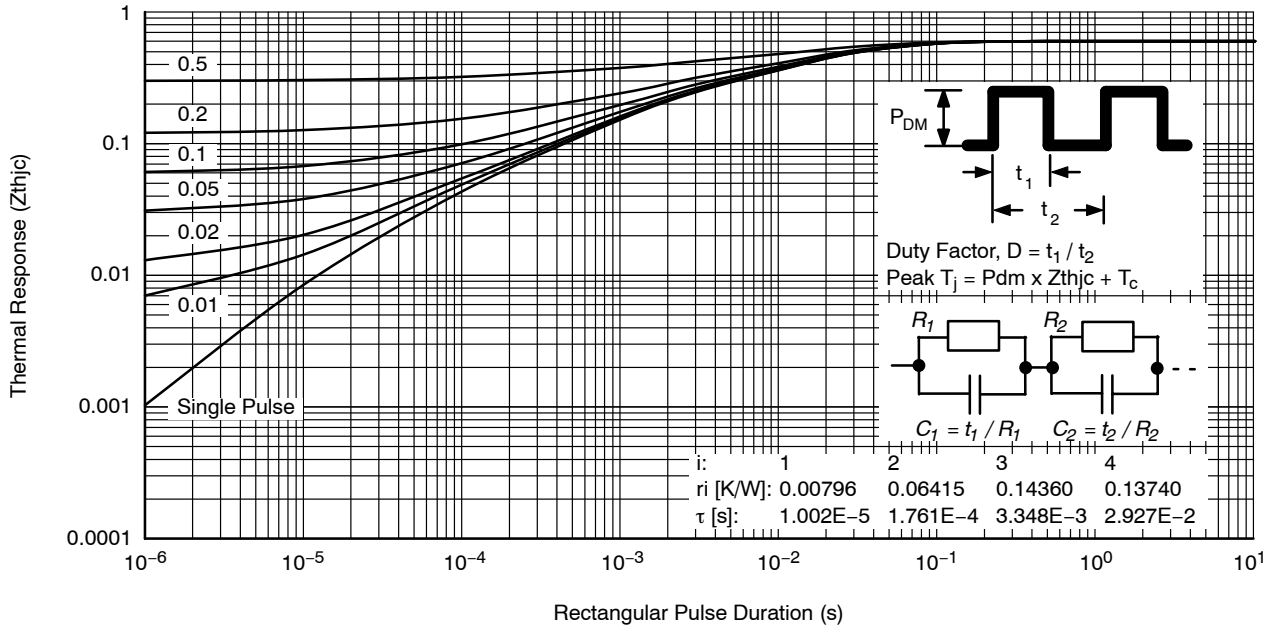
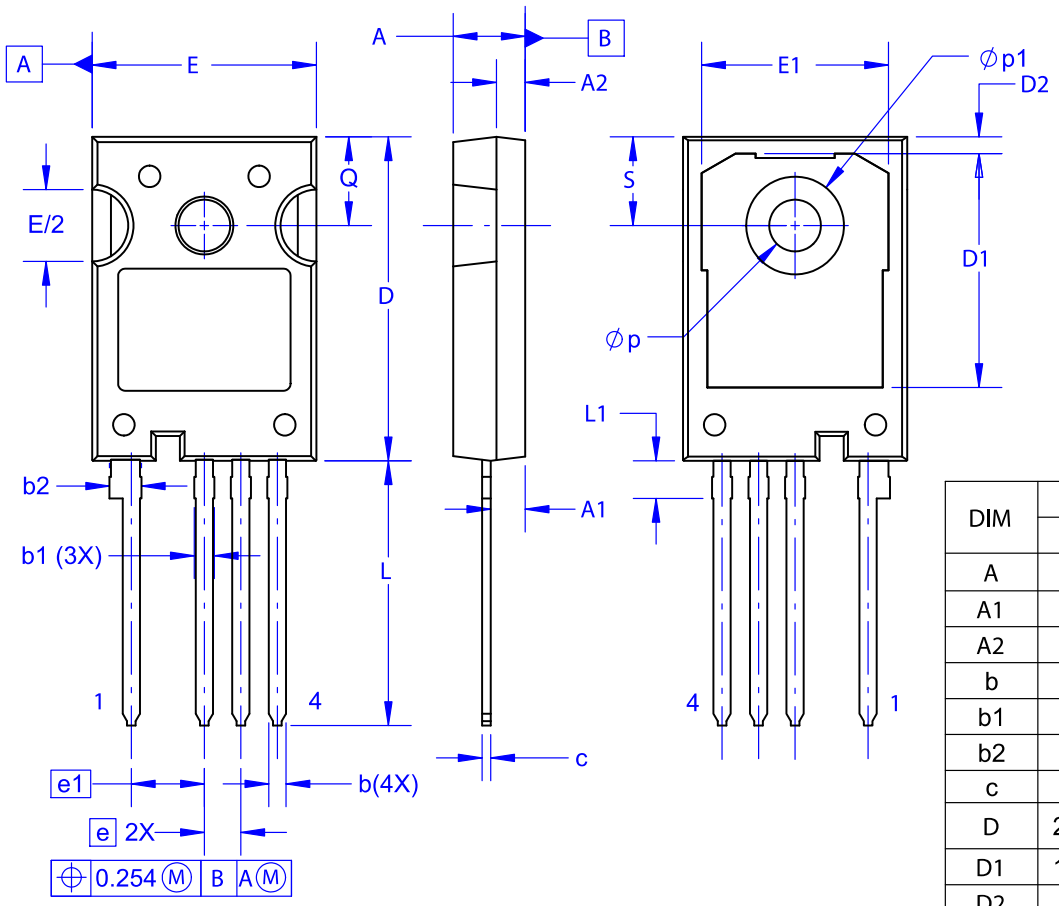


Figure 20. Transient Thermal Impedance of Diode

PACKAGE DIMENSIONS

TO−247−4LD
CASE 340CJ
ISSUE A



NOTES:

A. NO INDUSTRY STANDARD APPLIES TO THIS PACKAGE.
B. DIMENSIONS ARE EXCLUSIVE OF BURRS,MOLD FLASH,AND TIE BAR EXTRUSIONS.
C. ALL DIMENSIONS ARE IN MILLIMETERS.
D. DRAWING CONFORMS TO ASME Y14.5-2009.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.80	5.00	5.20
A1	2.10	2.40	2.70
A2	1.80	2.00	2.20
b	1.07	1.20	1.33
b1	1.20	1.40	1.60
b2	2.02	2.22	2.42
c	0.50	0.60	0.70
D	22.34	22.54	22.74
D1	16.00	16.25	16.50
D2	0.97	1.17	1.37
e	2.54 BSC		
e1	5.08 BSC		
E	15.40	15.60	15.80
E1	12.80	13.00	13.20
E/2	4.80	5.00	5.20
L	18.22	18.42	18.62
L1	2.42	2.62	2.82
p	3.40	3.60	3.80
p1	6.60	6.80	7.00
Q	5.97	6.17	6.37
S	5.97	6.17	6.37

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