IGBT – Power, Co-PAK N-Channel, Field Stop VII (FS7), Non SCR, TO247-3L
1200 V, 1.7 V, 40 A

FGHL40T120SWD

BV_{CES}	$V_{CE(SAT)}$	I_C
1200 V	1.7 V	40 A

Description

Using the novel field stop 7th generation IGBT technology and the Gen7 Diode in TO247 3−lead package, FGHL40T120SWD offers the optimum performance with low switching and conduction losses for high efficiency operations in various applications like Solar, UPS and ESS.

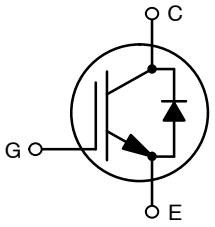
Features

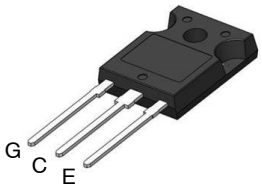
- Maximum Junction Temperature − T_J = 175°C
- Positive Temperature Coefficient for Easy Parallel Operation
- High Current Capability
- Smooth and Optimized Switching
- Low Switching Loss
- RoHS Compliant

Applications

- Boost and Inverter in Solar Applications
- UPS
- Energy Storage System

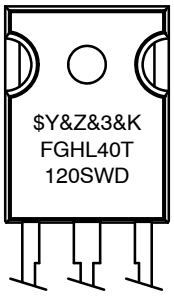
PIN CONNECTIONS





TO−247−3LD
CASE 340CX

MARKING DIAGRAM



$Y	= **onsemi** Logo
&Z	= Assembly Plant Code
&3	= 3−Digit Date Code
&K	= 2−Digit Lot Traceability Code
FGHL40T120SWD	= Specific Device Code

MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter		Symbol	Value	Unit
Collector−to−Emitter Voltage		V_{CES}	1200	V
Gate−to−Emitter Voltage		V_{GES}	±20	
Transient Gate−to−Emitter Voltage			±30	
Collector Current	T_C = 25°C (Note 1)	I_C	70	A
	T_C = 100°C		40	
Power Dissipation	T_C = 25°C	P_D	469	W
	T_C = 100°C		234	
Pulsed Collector Current	T_C = 25°C (Note 2) t_p = 10 μs	I_{CM}	160	A
Diode Forward Current	T_C = 25°C (Note 1)	I_F	80	
	T_C = 100°C		40	
Pulsed Diode Maximum Forward Current	T_C = 25°C, t_p = 10 μs	I_{FM}	160	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to +175	°C
Lead Temperature for Soldering Purposes		T_L	260	

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. Repetitive rating: Pulse width limited by max. junction temperature

ORDERING INFORMATION

Device	Package	Shipping
FGHL40T120SWD	TO−247 (Pb−Free)	30 Units / Tube

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THERMAL CHARACTERISTICS

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction−to−Case for IGBT	$R_{\theta JC}$	0.32	°C/W
Thermal Resistance, Junction−to−Case for Diode	$R_{\theta JCD}$	0.57	
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$	40	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Collector−to−Emitter Breakdown Voltage	BV_{CES}	V_{GE} = 0 V, I_C = 5 mA	1200	–	–	V
Collector−to−Emitter Breakdown Voltage Temperature Coefficient	$\frac{\Delta BV_{CES}}{\Delta T_J}$	V_{GE} = 0 V, I_C = 5 mA	–	1226	–	mV/°C
Zero Gate Voltage Collector Current	I_{CES}	V_{GE} = 0 V, V_{CE} = V_{CES}	–	–	40	μA
Gate−to−Emitter Leakage Current	I_{GES}	V_{GE} = 20 V, V_{CE} = 0 V	–	–	±400	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	$V_{GE(th)}$	V_{GE} = V_{CE}, I_C = 40 mA	5.6	6.55	7.4	V
Collector−to−Emitter Saturation Voltage	$V_{CE(sat)}$	V_{GE} = 15 V, I_C = 40 A, T_J = 25°C	1.35	1.68	2.0	V
		V_{GE} = 15 V, I_C = 40 A, T_J = 175°C	–	2.26	–	
DYNAMIC CHARACTERISTICS						
Input Capacitance	C_{ies}	V_{CE} = 30 V, V_{GE} = 0 V, f = 1 MHz	–	3384	–	pF
Output Capacitance	C_{oes}		–	139	–	
Reverse Transfer Capacitance	C_{res}		–	16.2	–	
Gate Charge Total	Q_g	V_{CE} = 600 V, V_{GE} = 15 V, I_C = 40 A	–	118	–	nC
Gate−to−Emitter Charge	Q_{ge}		–	28.8	–	
Gate−to−Collector Charge	Q_{gc}		–	45.4	–	
SWITCHING CHARACTERISTICS						
Turn−on Delay Time	$t_{d(on)}$	V_{CE} = 600 V, V_{GE} = 0/15 V I_C = 20 A R_G = 4.7 Ω T_J = 25°C	–	22.4	–	ns
Turn−off Delay Time	$t_{d(off)}$		–	160	–	
Rise Time	t_r		–	14.4	–	
Fall Time	t_f		–	78.4	–	
Turn−on Switching Loss	E_{on}		–	1.1	–	mJ
Turn−off Switching Loss	E_{off}		–	0.7	–	
Total Switching Loss	E_{ts}		–	1.8	–	
Turn−on Delay Time	$t_{d(on)}$	V_{CE} = 600 V, V_{GE} = 0/15 V I_C = 40 A R_G = 4.7 Ω T_J = 25°C	–	24.0	–	ns
Turn−off Delay Time	$t_{d(off)}$		–	118	–	
Rise Time	t_r		–	35.2	–	
Fall Time	t_f		–	67.4	–	
Turn−on Switching Loss	E_{on}		–	2.4	–	mJ
Turn−off Switching Loss	E_{off}		–	1.1	–	
Total Switching Loss	E_{ts}		–	3.5	–	

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
SWITCHING CHARACTERISTICS						
Turn–on Delay Time	$t_{d(on)}$	V_{CE} = 600 V, V_{GE} = 0/15 V I_C = 20 A R_G = 4.7 Ω T_J = 175°C	–	19.2	–	ns
Turn–off Delay Time	$t_{d(off)}$		–	197	–	
Rise Time	t_r		–	16.0	–	
Fall Time	t_f		–	126	–	
Turn–on Switching Loss	E_{on}		–	1.8	–	mJ
Turn–off Switching Loss	E_{off}		–	1.1	–	
Total Switching Loss	E_{ts}		–	3.0	–	
Turn–on Delay Time	$t_{d(on)}$	V_{CE} = 600 V, V_{GE} = 0/15 V I_C = 40 A R_G = 4.7 Ω T_J = 175°C	–	20.8	–	ns
Turn–off Delay Time	$t_{d(off)}$		–	138	–	
Rise Time	t_r		–	35.2	–	
Fall Time	t_f		–	99.6	–	
Turn–on Switching Loss	E_{on}		–	3.6	–	mJ
Turn–off Switching Loss	E_{off}		–	1.5	–	
Total Switching Loss	E_{ts}		–	5.2	–	
DIODE CHARACTERISTICS						
Forward Voltage	V_F	I_F = 40 A, T_J = 25°C	1.62	1.87	2.22	V
		I_F = 40 A, T_J = 175°C	–	1.84	–	
DIODE SWITCHING CHARACTERISTICS, INDUCTIVE LOAD						
Reverse Recovery Time	t_{rr}	V_R = 600 V, I_F = 20 A, dI_F/dt = 1000 A/μs, T_J = 25°C	–	113	–	ns
Reverse Recovery Charge	Q_{rr}		–	1433	–	nC
Reverse Recovery Energy	E_{REC}		–	0.4	–	mJ
Peak Reverse Recovery Current	I_{RRM}		–	25.3	–	A
Reverse Recovery Time	t_{rr}	V_R = 600 V, I_F = 40 A, dI_F/dt = 1000 A/μs, T_J = 25°C	–	185	–	ns
Reverse Recovery Charge	Q_{rr}		–	2512	–	nC
Reverse Recovery Energy	E_{REC}		–	0.7	–	mJ
Peak Reverse Recovery Current	I_{RRM}		–	26.9	–	A
Reverse Recovery Time	t_{rr}	V_R = 600 V, I_F = 20 A, dI_F/dt = 1000 A/μs, T_J = 175°C	–	193	–	ns
Reverse Recovery Charge	Q_{rr}		–	3258	–	nC
Reverse Recovery Energy	E_{REC}		–	1.0	–	mJ
Peak Reverse Recovery Current	I_{RRM}		–	33.6	–	A
Reverse Recovery Time	t_{rr}	V_R = 600 V, I_F = 40 A, dI_F/dt = 1000 A/μs, T_J = 175°C	–	275	–	ns
Reverse Recovery Charge	Q_{rr}		–	5211	–	nC
Reverse Recovery Energy	E_{REC}		–	1.7	–	mJ
Peak Reverse Recovery Current	I_{RRM}		–	37.9	–	A

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.

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TYPICAL CHARACTERISTICS

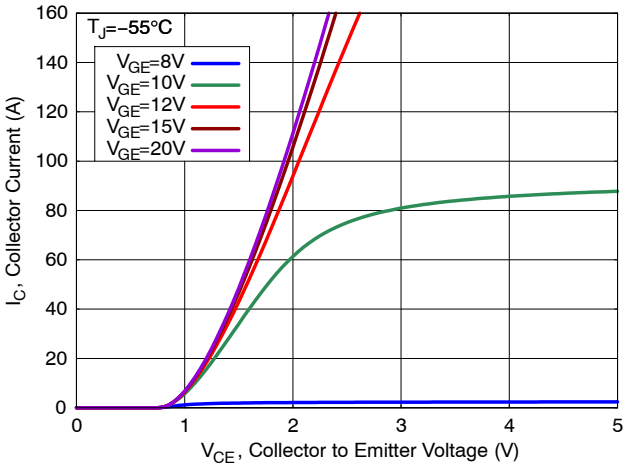


Figure 1. Output Characteristics

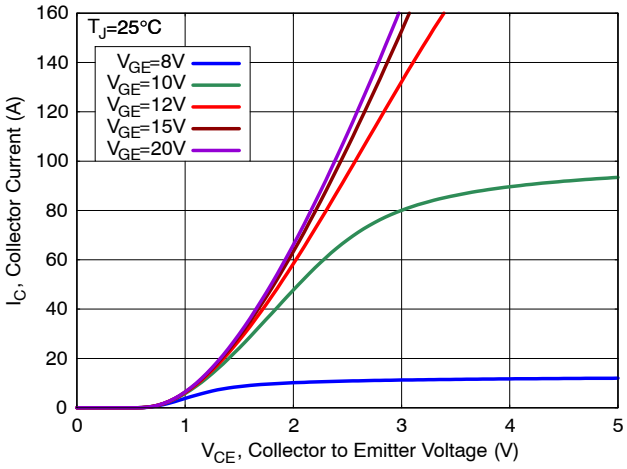


Figure 2. Output Characteristics

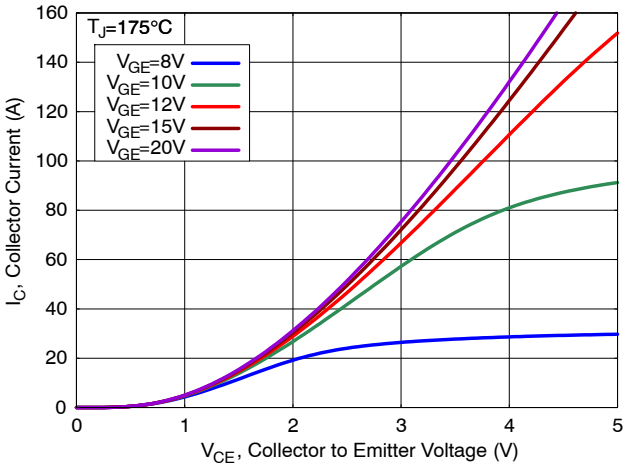


Figure 3. Output Characteristics

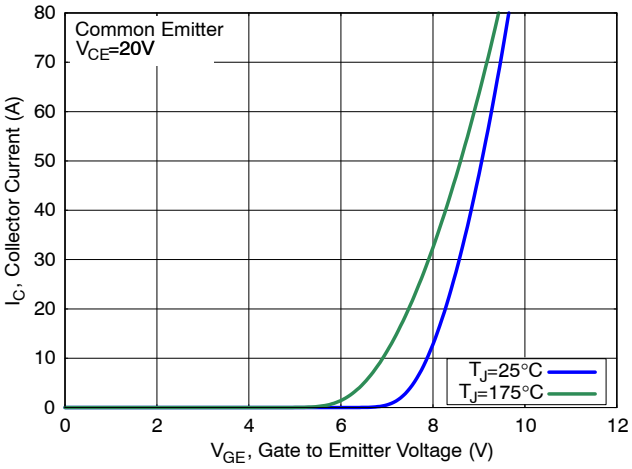


Figure 4. Transfer Characteristics

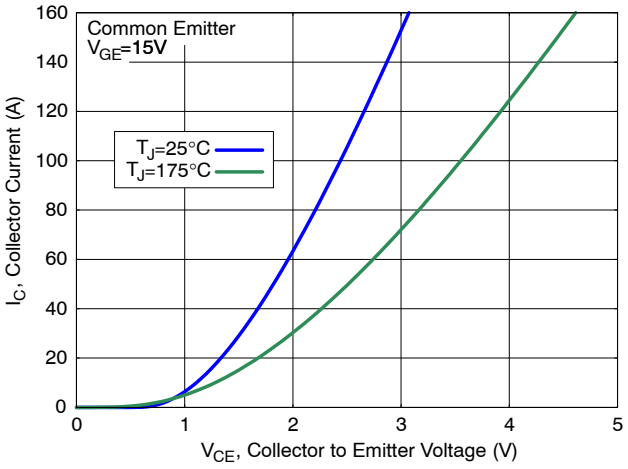


Figure 5. Saturation Characteristics

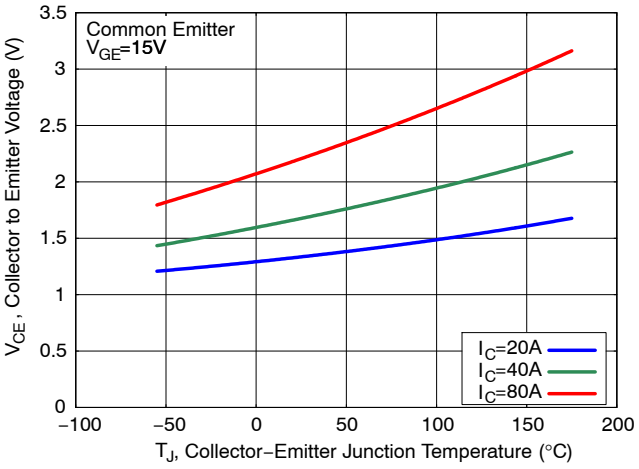


Figure 6. Saturation Voltage vs. Junction Temperature

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TYPICAL CHARACTERISTICS

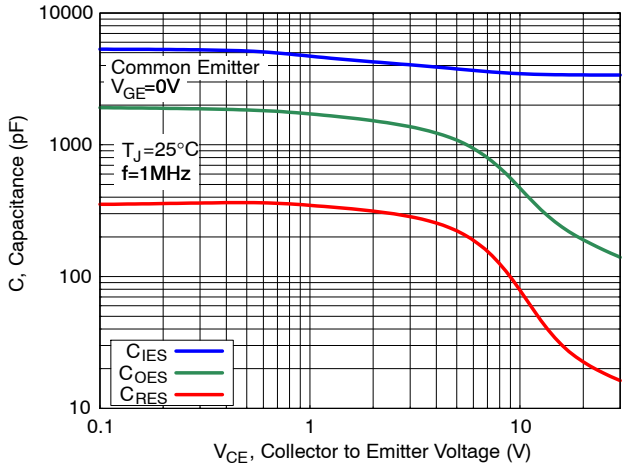


Figure 7. Capacitance Characteristics

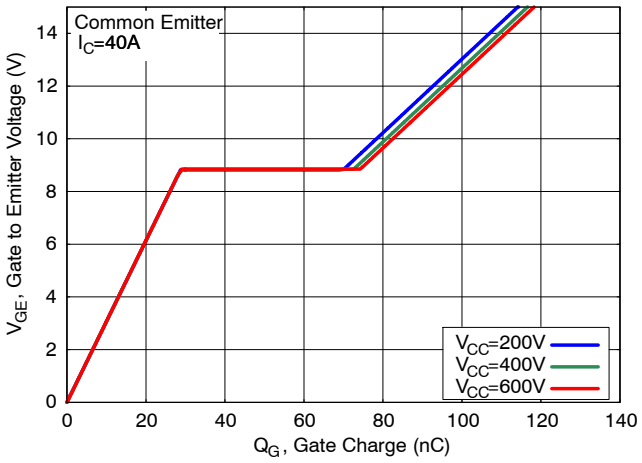


Figure 8. Gate Charge Characteristics

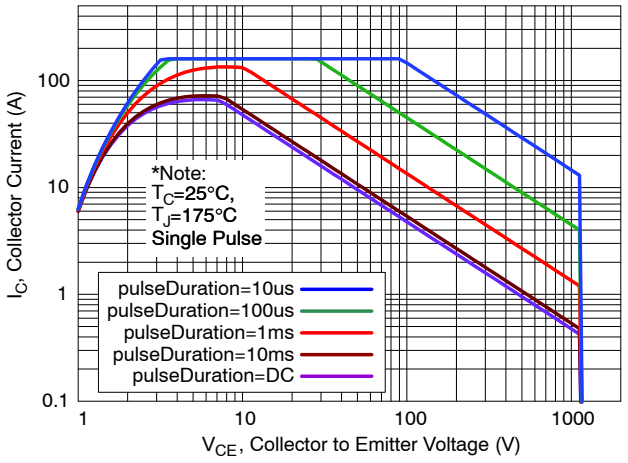


Figure 9. SOA Characteristics

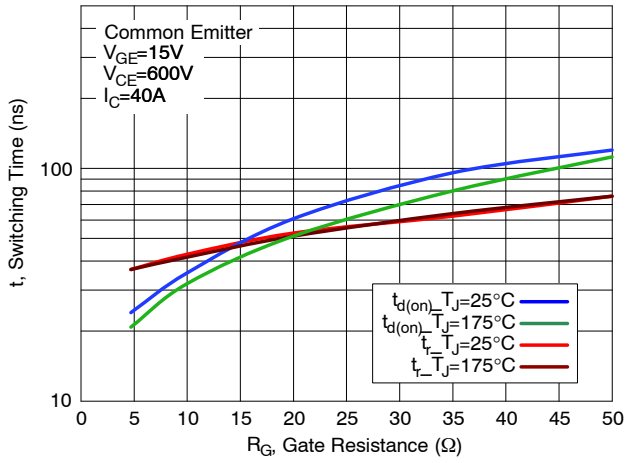


Figure 10. Turn−On Switching Time vs. Gate Resistance

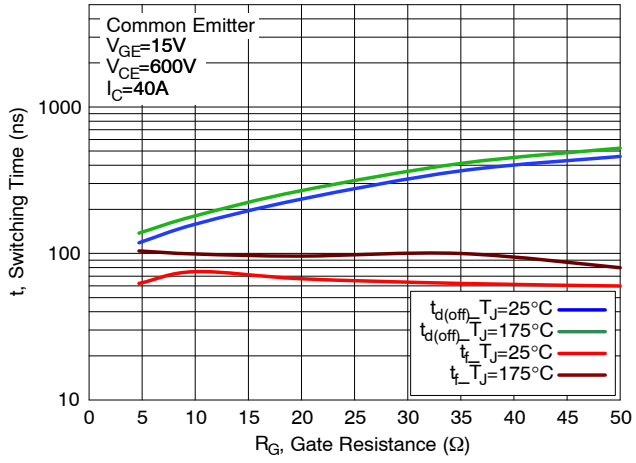


Figure 11. Turn−Off Switching Time vs. Gate Resistance

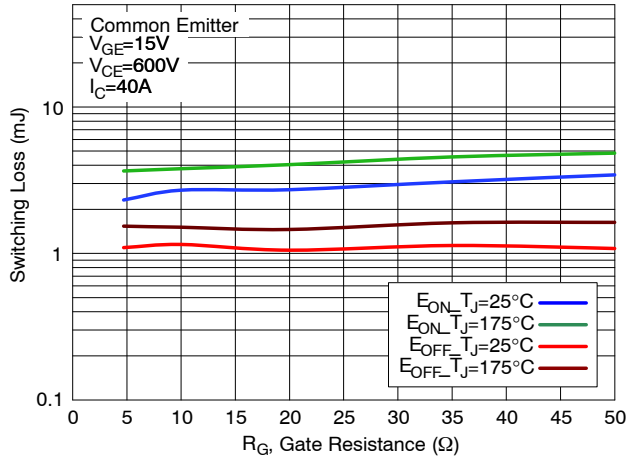


Figure 12. Switching Loss vs. Gate Resistance

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TYPICAL CHARACTERISTICS

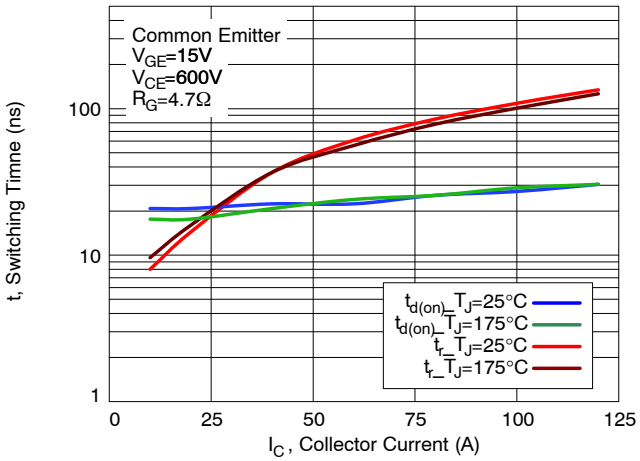


Figure 13. Turn−On Switching Time vs. Collector Current

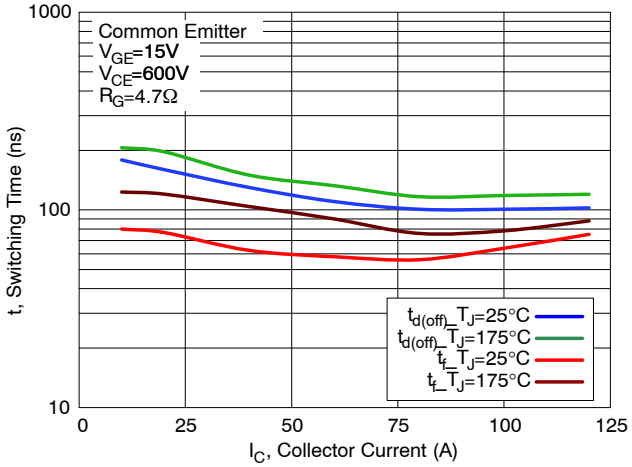


Figure 14. Turn−Off Switching Time vs. Collector Current

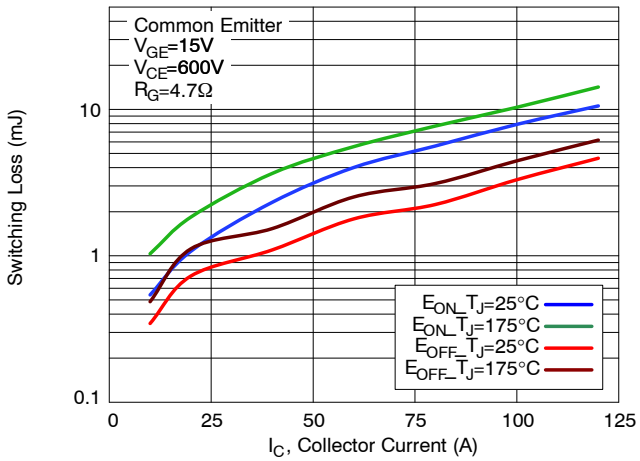


Figure 15. Switching Loss vs. Collector Current

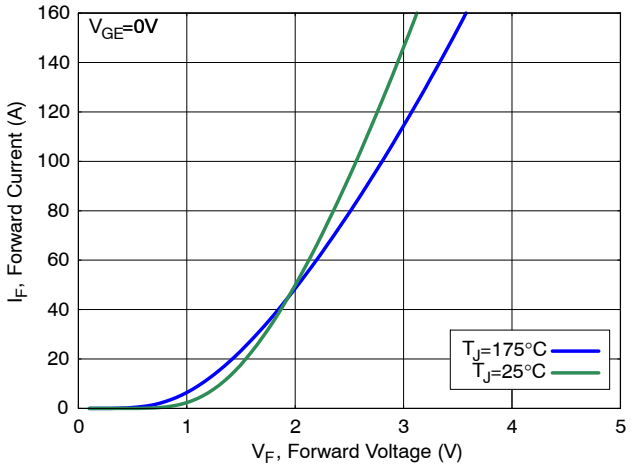


Figure 16. Diode Forward Characteristics

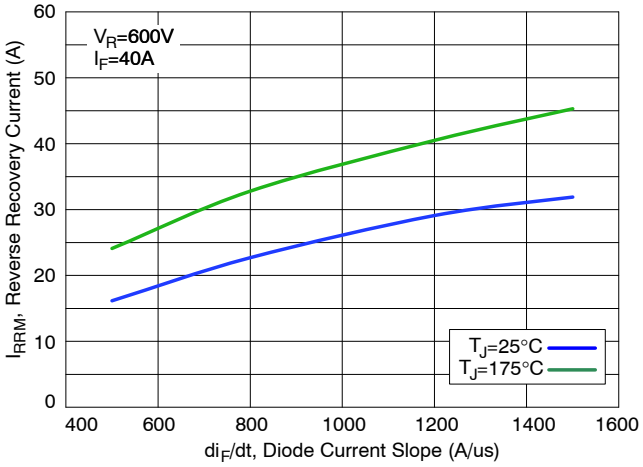


Figure 17. Diode Reverse Recovery Current

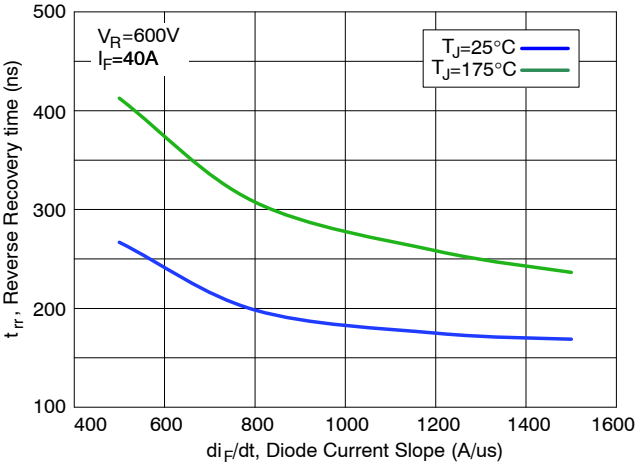


Figure 18. Diode Reverse Recovery Time

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TYPICAL CHARACTERISTICS

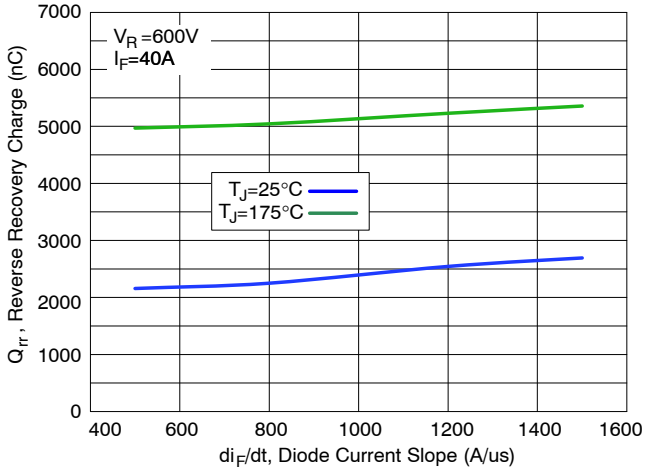


Figure 19. Diode Stored Charge Characteristics

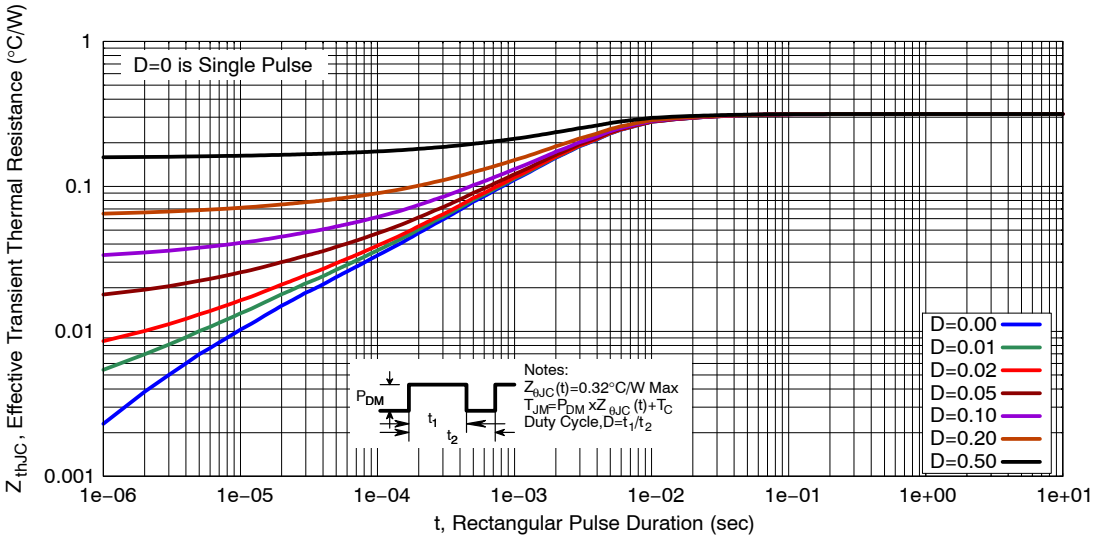


Figure 20. Transient Thermal Impedance of IGBT

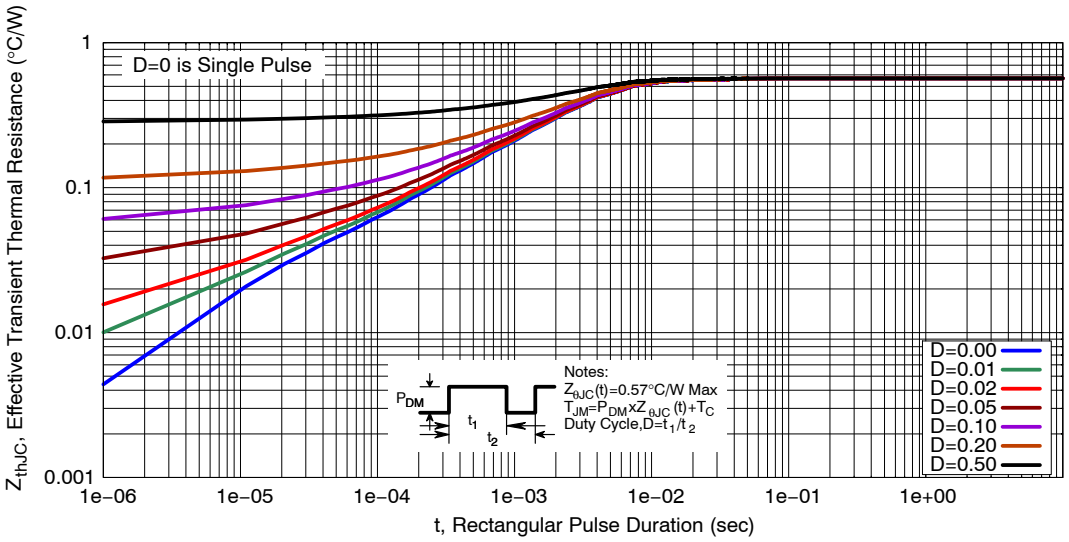
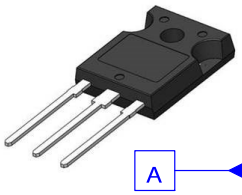


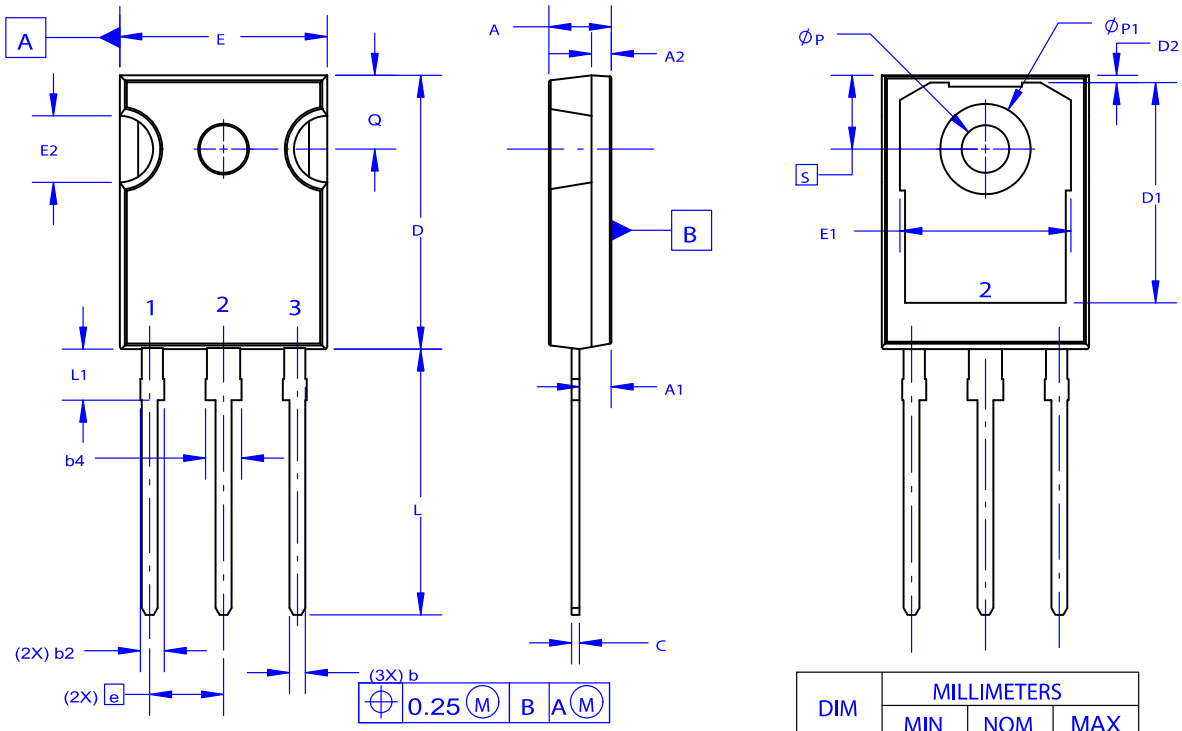
Figure 21. Transient Thermal Impedance of Diode

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TO−247−3LD
CASE 340CX
ISSUE A

DATE 06 JUL 2020





NOTES: UNLESS OTHERWISE SPECIFIED.

A. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR EXTRUSIONS.
B. ALL DIMENSIONS ARE IN MILLIMETERS.
C. DRAWING CONFORMS TO ASME Y14.5 - 2009.
D. DIMENSION A1 TO BE MEASURED IN THE REGION DEFINED BY L1.
E. LEAD FINISH IS UNCONTROLLED IN THE REGION DEFINED BY L1.

DIM	MILLIMETERS		
	MIN	NOM	MAX
A	4.58	4.70	4.82
A1	2.20	2.40	2.60
A2	1.40	1.50	1.60
D	20.32	20.57	20.82
E	15.37	15.62	15.87
E2	4.96	5.08	5.20
e	~	5.56	~
L	19.75	20.00	20.25
L1	3.69	3.81	3.93
ØP	3.51	3.58	3.65
Q	5.34	5.46	5.58
S	5.34	5.46	5.58
b	1.17	1.26	1.35
b2	1.53	1.65	1.77
b4	2.42	2.54	2.66
c	0.51	0.61	0.71
D1	13.08	~	~
D2	0.51	0.93	1.35
E1	12.81	~	~
ØP1	6.60	6.80	7.00

GENERIC MARKING DIAGRAM*



XXXXX = Specific Device Code
A = Assembly Location
Y = Year
WW = Work Week
G = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, “G” or microdot “ ▪”, may or may not be present. Some products may not follow the Generic Marking.

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Elektronik komponent tedarikinde Entegreci

Entegreci, Eskişehir merkezli, Türkiye geneline satış yapan bir elektronik komponent mağazasıdır. Entegreler (IC), mikrodenetleyiciler, transistörler, diyotlar, pasif elemanlar, konnektörler, modüller ve geliştirme kartları tek adetten seri üretim adetlerine kadar satılır. Ürün sayfalarında güncel stok durumunu, fiyatı ve datasheet bağlantısını bulabilirsiniz.

Parça koduyla arama

Üretici parça numarasını yazın; stok ve fiyatı hemen görün.

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Ürün kategorileri

Entegreden kapasitöre tüm elektronik komponent kategorileri.

Kategorilere göz atın

Üreticiler

Aradığınız üreticinin ürünlerini tek sayfada inceleyin.

Üreticileri görün

Toplu alım ve teklif

Listede olmayan ya da yüksek adetli parçalar için teklif isteyin.

Teklif isteyin

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Entegreci is an online electronic components store based in Türkiye. Search by manufacturer part number to see stock, prices and datasheets for integrated circuits, microcontrollers, transistors, passive components and connectors, or request a quote for parts that are not listed.

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