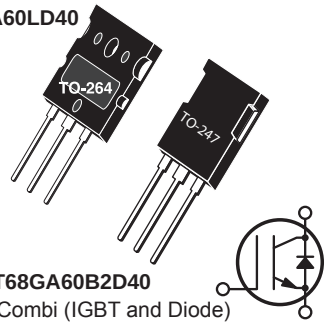
Microsemi
POWER PRODUCTS GROUP

Power MOS 8 Cooler!

APT68GA60LD40
APT68GA60B2D40

600V

High Speed PT IGBT



APT68GA60B2D40
Combi (IGBT and Diode)

POWER MOS 8® is a high speed Punch-Through switch-mode IGBT. Low E_{off} is achieved through leading technology silicon design and lifetime control processes. A reduced E_{off} - $V_{CE(ON)}$ tradeoff results in superior efficiency compared to other IGBT technologies. Low gate charge and a greatly reduced ratio of C_{res}/C_{ies} provide excellent noise immunity, short delay times and simple gate drive. The intrinsic chip gate resistance and capacitance of the poly-silicone gate structure help control di/dt during switching, resulting in low EMI, even when switching at high frequency.

FEATURES

- **Fast switching with low EMI**
- **Very Low E_{off} for maximum efficiency**
- **Ultra low C_{res} for improved noise immunity**
- **Low conduction loss**
- **Low gate charge**
- **Increased intrinsic gate resistance for low EMI**
- **RoHS compliant**

TYPICAL APPLICATIONS

- **ZVS phase shifted and other full bridge**
- **Half bridge**
- **High power PFC boost**
- **Welding**
- **UPS, solar, and other inverters**
- **High frequency, high efficiency industrial**

Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_{ces}	Collector Emitter Voltage	600	V
I_{C1}	Continuous Collector Current @ T_C = 25°C	121	A
I_{C2}	Continuous Collector Current @ T_C = 100°C	68	
I_{CM}	Pulsed Collector Current [1]	202	
V_{GE}	Gate-Emitter Voltage [2]	±30	V
P_D	Total Power Dissipation @ T_C = 25°C	520	W
SSOA	Switching Safe Operating Area @ T_J = 150°C	202A @ 600V	
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Lead Temperature for Soldering: 0.063" from Case for 10 Seconds	300	

Static Characteristics

T_J = 25°C unless otherwise specified

Symbol	Parameter	Test Conditions		Min	Typ	Max	Unit
$V_{BR(CES)}$	Collector-Emitter Breakdown Voltage	V_{GE} = 0V, I_C = 250µA		600			V
$V_{CE(on)}$	Collector-Emitter On Voltage	V_{GE} = 15V, I_C = 40A	T_J = 25°C		2.0	2.5	
			T_J = 125°C		1.9		
$V_{GE(th)}$	Gate Emitter Threshold Voltage	V_{GE} = V_{CE}, I_C = 1mA		3	4.5	6	
I_{CES}	Zero Gate Voltage Collector Current	V_{CE} = 600V, V_{GE} = 0V	T_J = 25°C			275	µA
			T_J = 125°C			3000	
I_{GES}	Gate-Emitter Leakage Current	V_{GS} = ±30V				±100	nA

052-6341 Rev F 6 - 2011

Dynamic Characteristics T_J = 25°C unless otherwise specified

APT68GA60L_B2D40

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance		5230		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		526		
C_{res}	Reverse Transfer Capacitance	f = 1MHz		59		
Q_g [3]	Total Gate Charge	Gate Charge		198		nC
Q_{ge}	Gate-Emitter Charge	V_{GE} = 15V		32		
Q_{gc}	Gate- Collector Charge	V_{CE}= 300V I_C = 40A		66		
SSOA	Switching Safe Operating Area	T_J = 150°C, R_G = 4.7Ω[4], V_{GE} = 15V, L= 100uH, V_{CE} = 600V	202			A
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C)		21		ns
t_r	Current Rise Time	V_{CC} = 400V		27		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		133		
t_f	Current Fall Time	I_C = 40A		88		
E_{on2}	Turn-On Switching Energy	R_G = 4.7Ω[4]		715		µJ
E_{off} [6]	Turn-Off Switching Energy	T_J = +25°C		607		
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C)		20		ns
t_r	Current Rise Time	V_{CC} = 400V		26		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		175		
t_f	Current Fall Time	I_C = 40A		129		
E_{on2}	Turn-On Switching Energy	R_G = 4.7Ω[4]		1117		µJ
E_{off} [6]	Turn-Off Switching Energy	T_J = +125°C		1025		

Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance (IGBT)	-	-	.24	°C/W
$R_{\theta JC}$	Junction to Case Thermal Resistance (Diode)			.67	
W_T	Package Weight	-	6.1	-	g
Torque	Mounting Torque (TO-264 Package), 4-40 or M3 screw			10	in·lbf

1 Repetitive Rating: Pulse width and case temperature limited by maximum junction temperature.

2 Pulse test: Pulse Width < 380μs, duty cycle < 2%.

3 See Mil-Std-750 Method 3471.

4 R_G is external gate resistance, not including internal gate resistance or gate driver impedance. (MIC4452)

5 E_{on2} is the clamped inductive turn on energy that includes a commutating diode reverse recovery current in the IGBT turn on energy loss. A combi device is used for the clamping diode.

6 E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1.

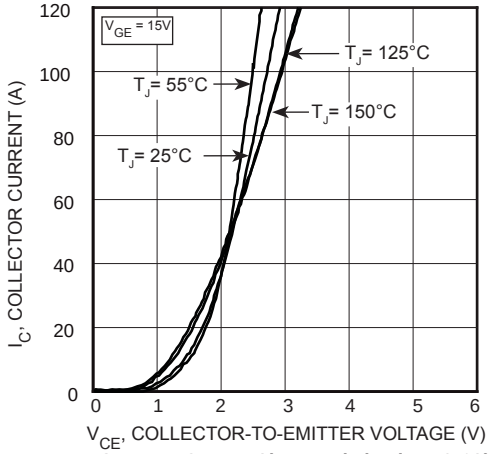


FIGURE 1, Output Characteristics (T_J = 25°C)

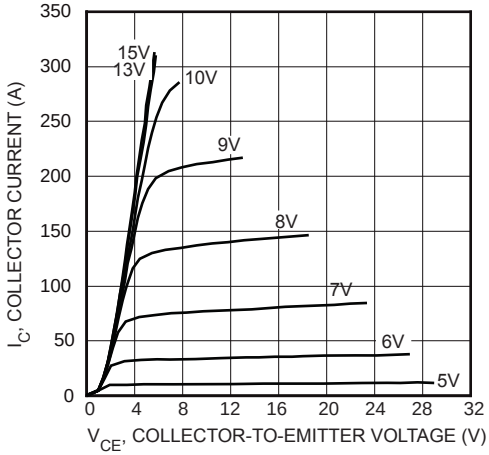


FIGURE 2, Output Characteristics (T_J = 25°C)

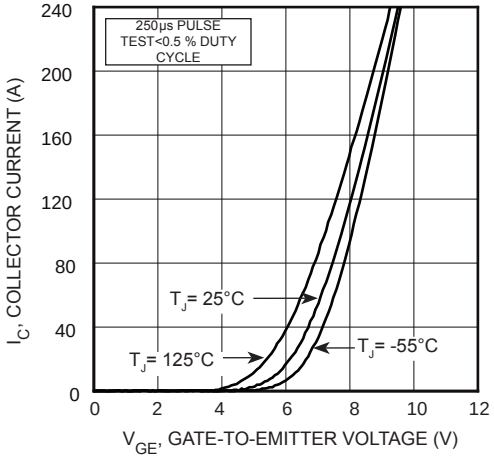


FIGURE 3, Transfer Characteristics

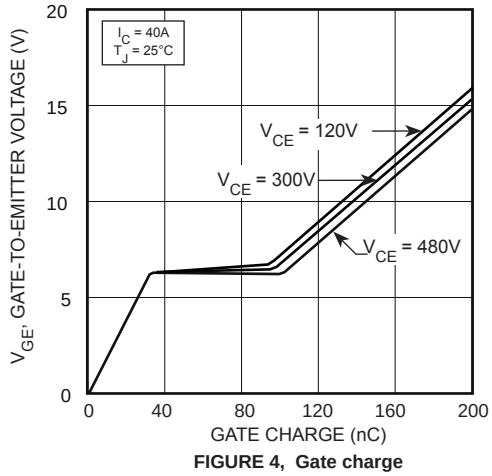


FIGURE 4, Gate charge

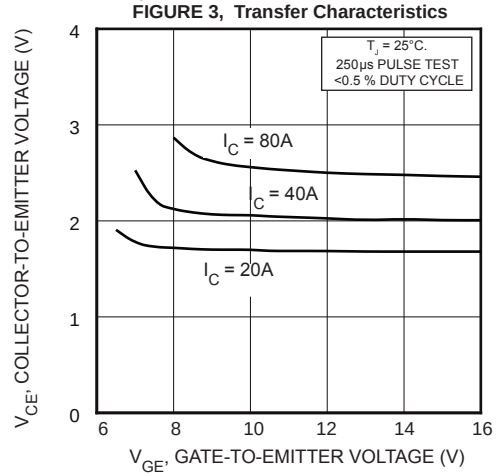


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

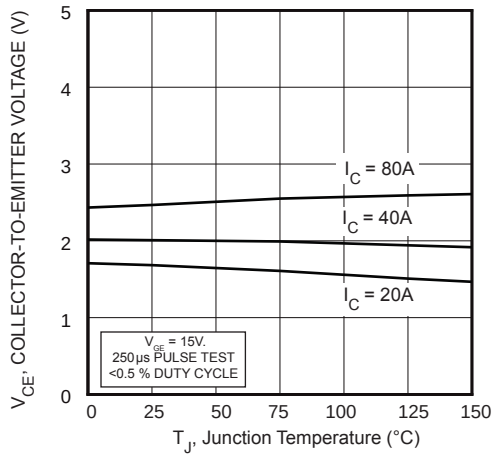


FIGURE 6, On State Voltage vs Junction Temperature

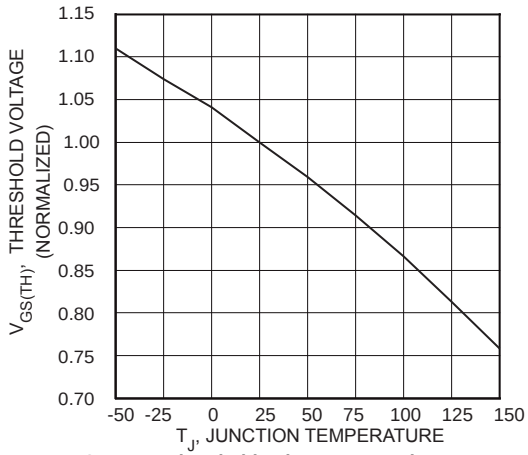


FIGURE 7, Threshold Voltage vs Junction Temperature

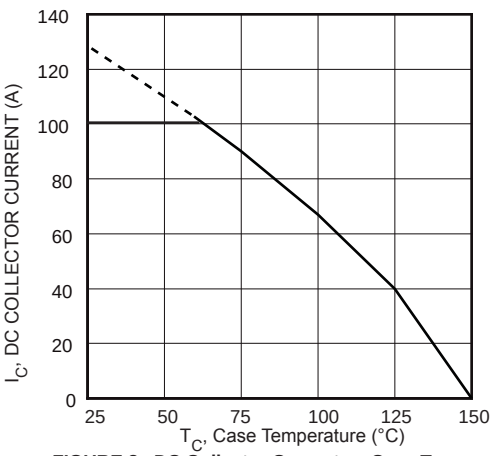


FIGURE 8, DC Collector Current vs Case Temperature

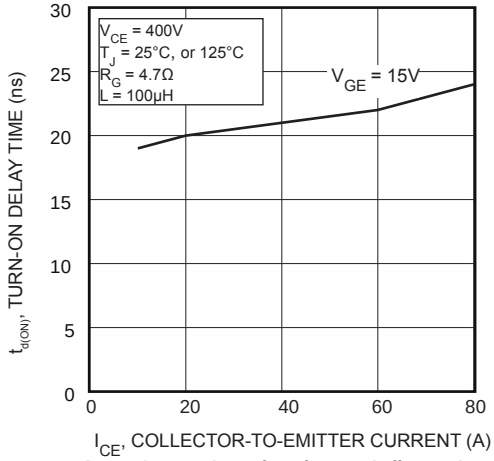


FIGURE 9, Turn-On Delay Time vs Collector Current

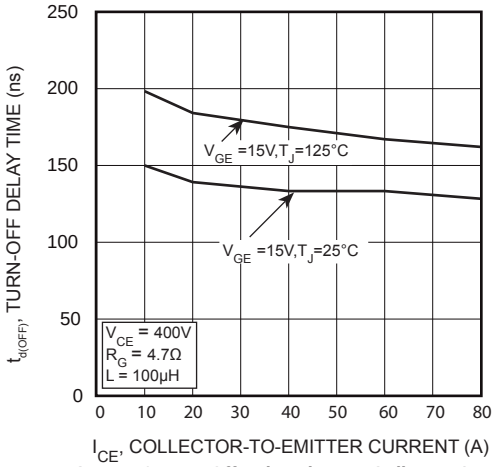


FIGURE 10, Turn-Off Delay Time vs Collector Current

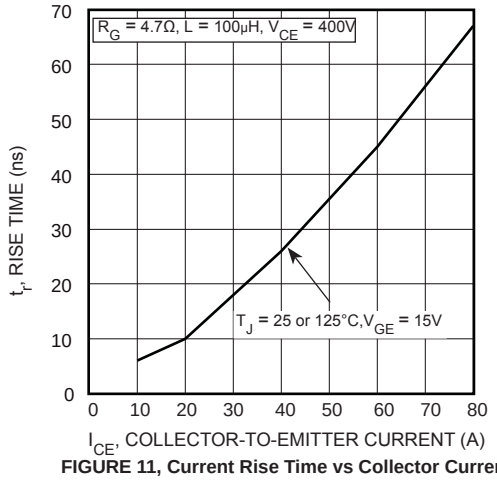


FIGURE 11, Current Rise Time vs Collector Current

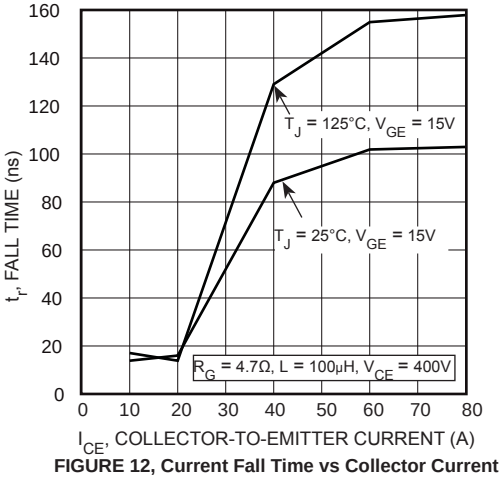


FIGURE 12, Current Fall Time vs Collector Current

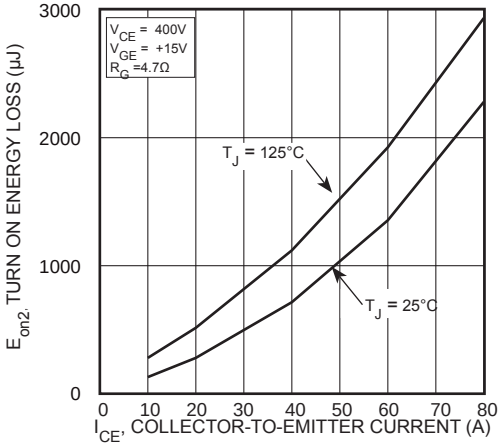


FIGURE 13, Turn-On Energy Loss vs Collector Current

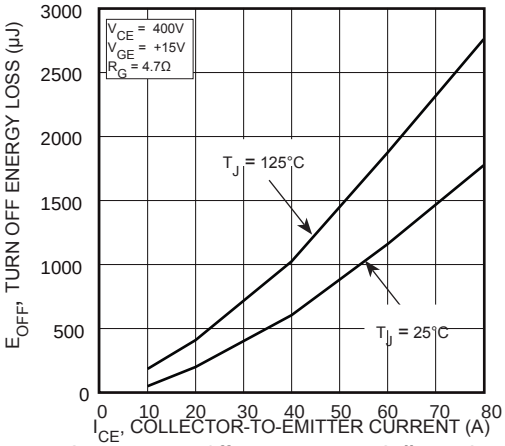


FIGURE 14, Turn-Off Energy Loss vs Collector Current

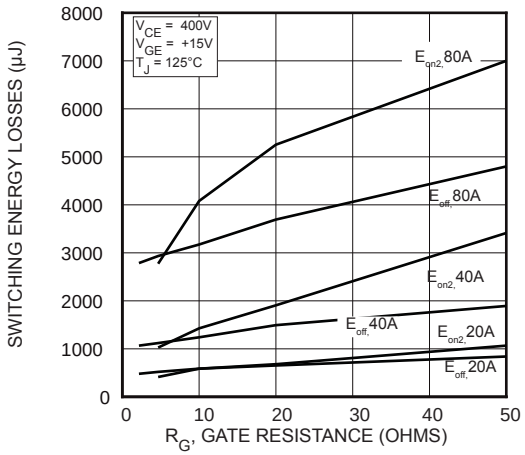


FIGURE 15, Switching Energy Losses vs Gate Resistance

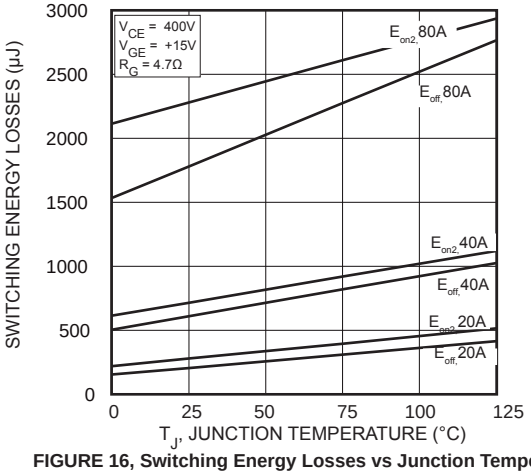


FIGURE 16, Switching Energy Losses vs Junction Temperature

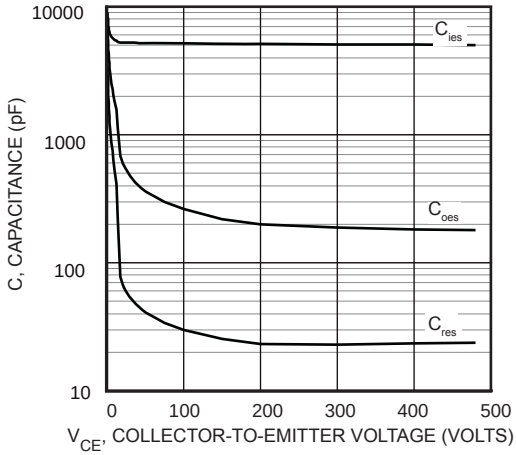


FIGURE 17, Capacitance vs Collector-To-Emitter Voltage

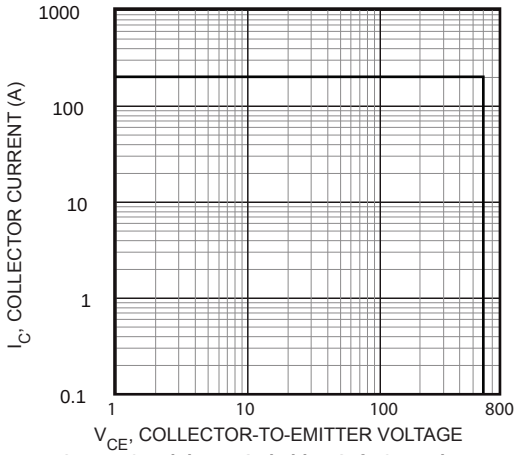


FIGURE 18, Minimum Switching Safe Operating Area

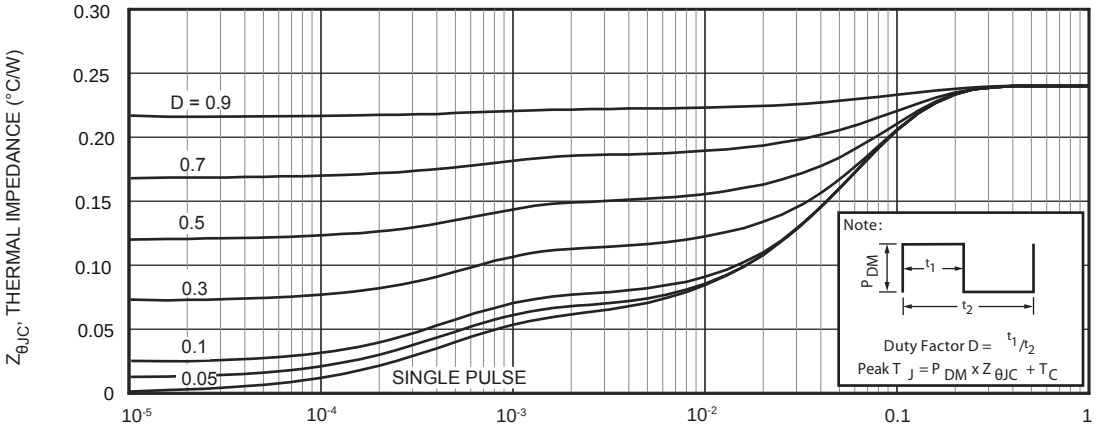


Figure 19, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

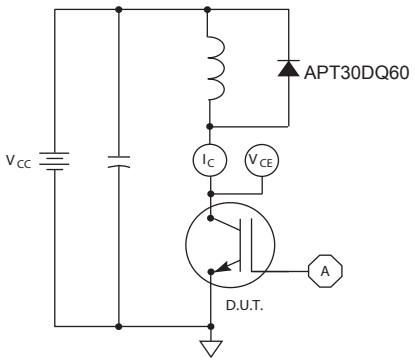


Figure 20, Inductive Switching Test Circuit

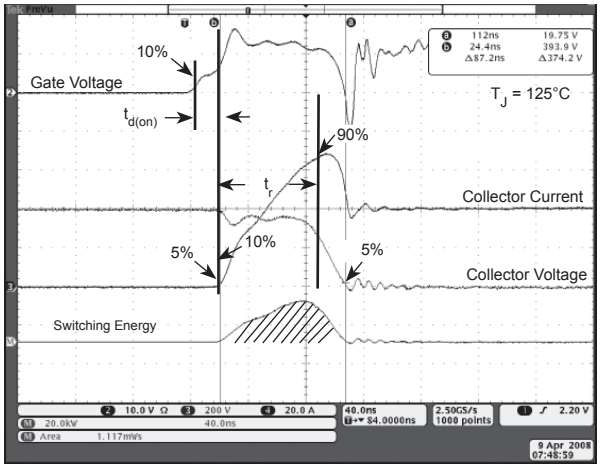


Figure 21, Turn-on Switching Waveforms and Definitions

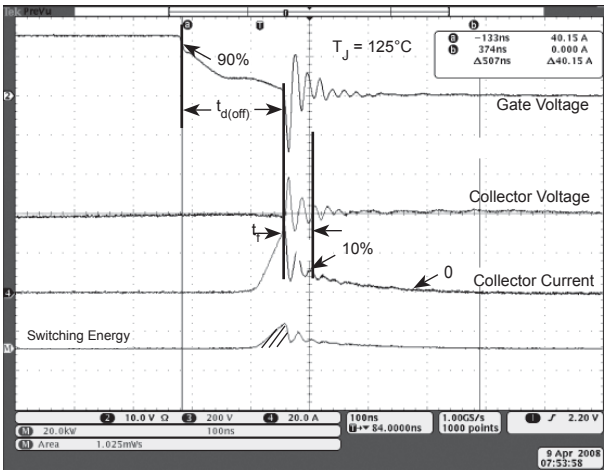


Figure 22, Turn-off Switching Waveforms and Definitions

ULTRAFAST SOFT RECOVERY RECTIFIER DIODE

MAXIMUM RATINGS — All Ratings: T_C = 25°C unless otherwise specified.

Symbol	Characteristic / Test Conditions	APT68GA60L_B2D40	Unit
$I_{F(AV)}$	Maximum Average Forward Current (T_C = 111°C, Duty Cycle = 0.5)	40	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	63	
I_{FSM}	Non-Repetitive Forward Surge Current (T_J = 45°C, 8.3 ms)	320	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions		Min	Type	Max	Unit
V_F	Forward Voltage	I_F = 40A		2.0		Volts
		I_F = 80A		2.5		
		I_F = 40A, T_J = 125°C		1.7		

DYNAMIC CHARACTERISTICS

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse Recovery Time	I_F = 1A, di_F/dt = -100A/µs, V_R = 30V, T_J = 25°C	-	22	-	ns
t_{rr}	Reverse Recovery Time	I_F = 40A, di_F/dt = -200A/µs V_R = 400V, T_C = 25°C	-	25	-	
Q_{rr}	Reverse Recovery Charge		-	35	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	3	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 40A, di_F/dt = -200A/µs V_R = 400V, T_C = 125°C	-	160	-	ns
Q_{rr}	Reverse Recovery Charge		-	480	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	6	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 40A, di_F/dt = -1000A/µs V_R = 400V, T_C = 125°C	-	85	-	ns
Q_{rr}	Reverse Recovery Charge		-	920	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	20	-	Amps

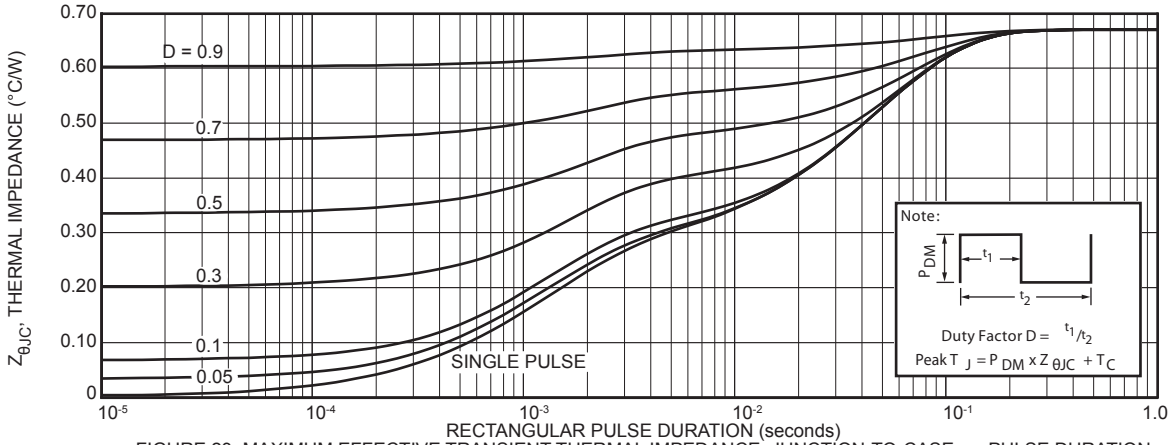


FIGURE 23. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

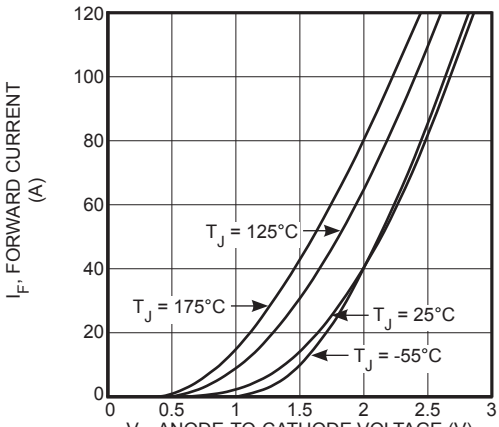


Figure 24. Forward Current vs. Forward Voltage

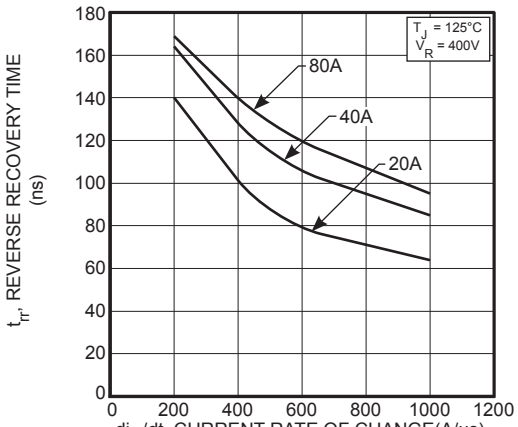


Figure 25. Reverse Recovery Time vs. Current Rate of Change

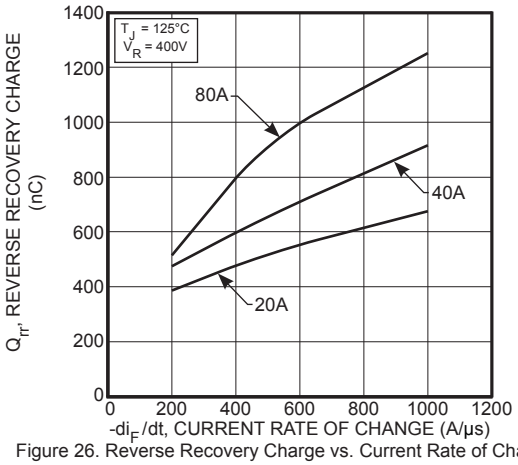


Figure 26. Reverse Recovery Charge vs. Current Rate of Change

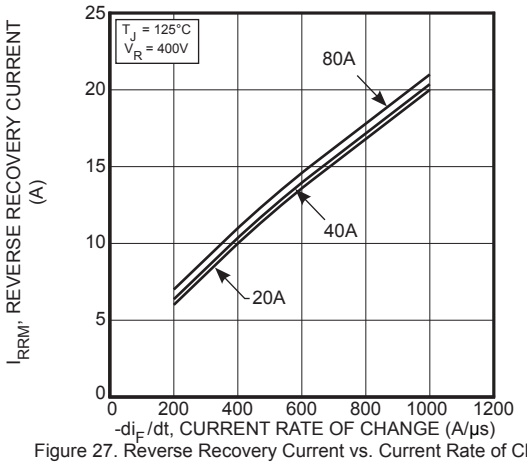


Figure 27. Reverse Recovery Current vs. Current Rate of Change

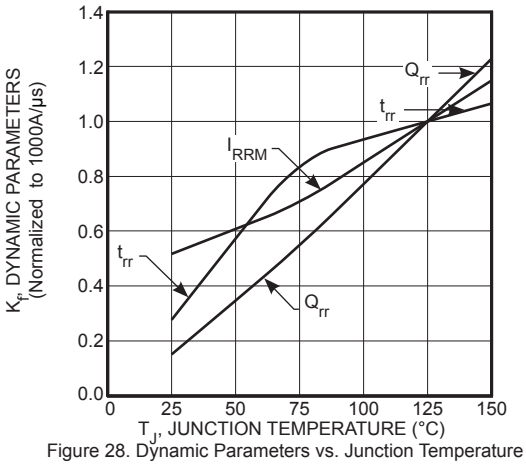


Figure 28. Dynamic Parameters vs. Junction Temperature

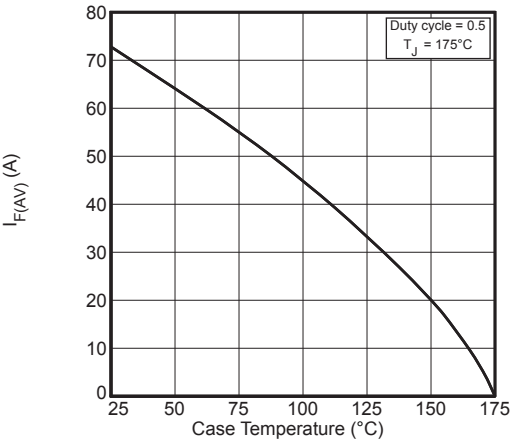


Figure 29. Maximum Average Forward Current vs. CaseTemperature

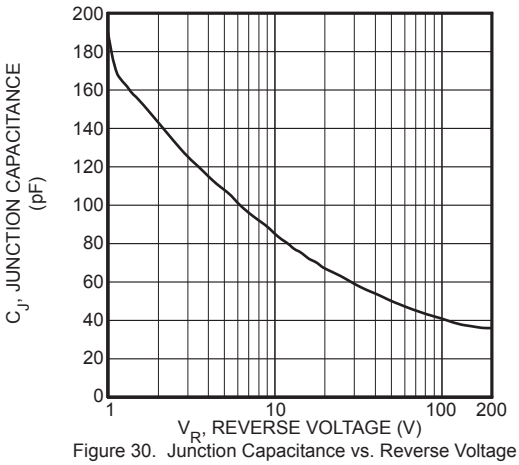


Figure 30. Junction Capacitance vs. Reverse Voltage

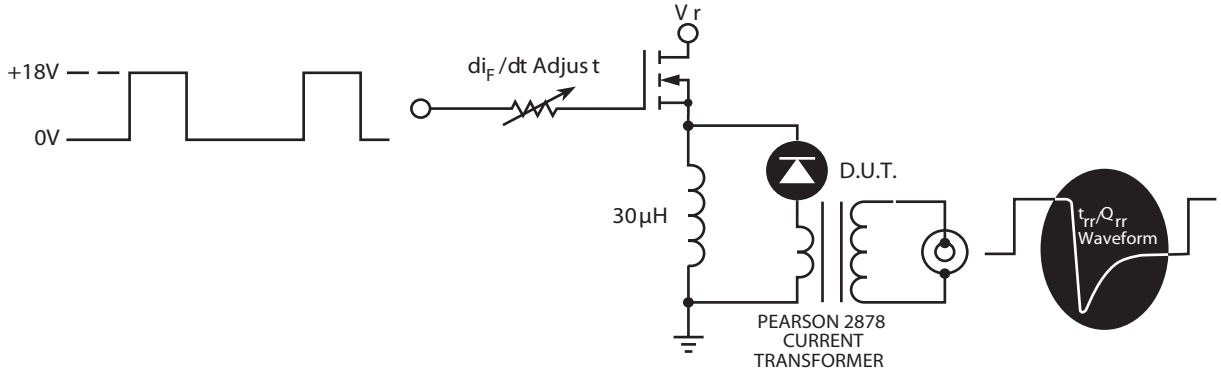
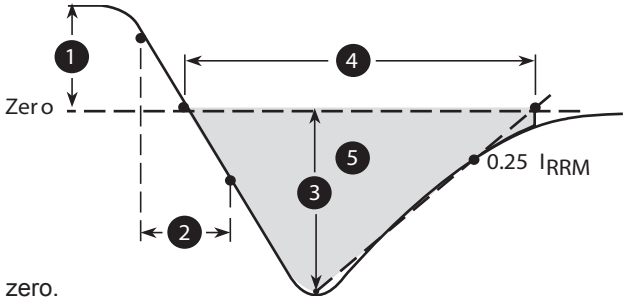


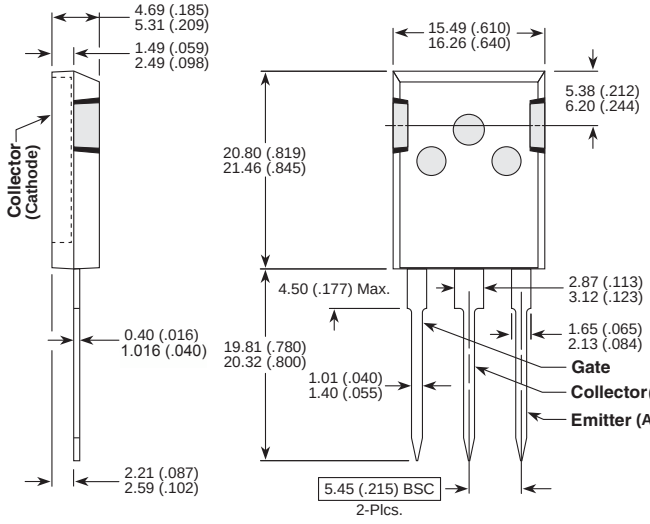
Figure 31. Diode Test Circuit



1. I_F - Forward Conduction Current
2. di_F/dt - Rate of Diode Current Change Through Zero Crossing.
3. I_{RRM} - Maximum Reverse Recovery Current
4. t_{rr} - Reverse Recovery Time measured from zero crossing where diode current goes from positive to negative, to the point at which the straight line through I_{RRM} and 0.25, I_{RRM} passes through zero.
5. Q_{rr} - Area Under the Curve Defined by I_{RRM} and t_{RR}.

Figure 32. Diode Reverse Recovery Waveform Definition

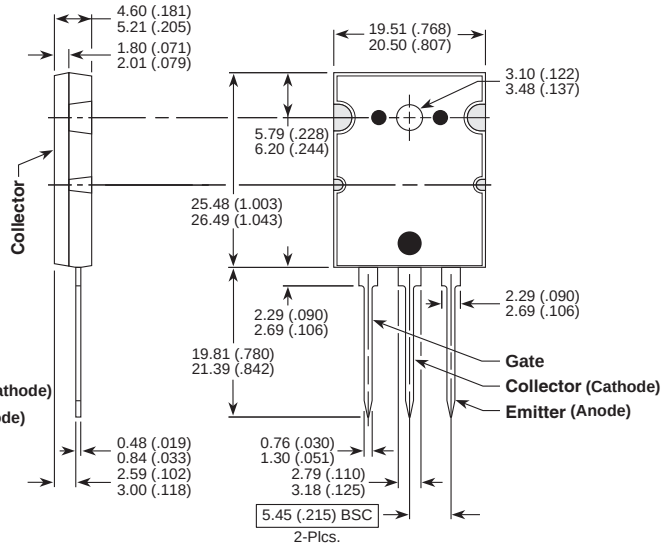
T-MAX™ (B2) Package Outline



These dimensions are equal to the TO-247 without the mounting hole.

Dimensions in Millimeters and (Inches)

TO-264 (L) Package Outline



Dimensions in Millimeters and (Inches)

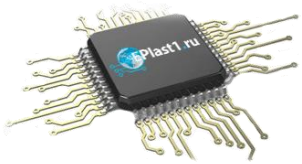
Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

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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