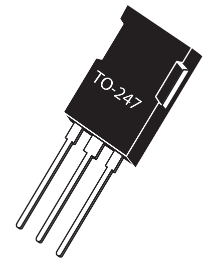
APT40GR120B2D30

1200V, 40A, $V_{CE(on)}$ = 2.5V Typical

Ultra Fast NPT - IGBT®

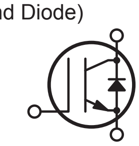
The Ultra Fast NPT - IGBT® is a new generation of high voltage power IGBTs. Using Non-Punch-Through Technology, the Ultra Fast NPT-IGBT® offers superior ruggedness and ultrafast switching speed.



Features

- **Low Saturation Voltage**
- **Low Tail Current**
- **RoHS Compliant**
- **Short Circuit Withstand Rated**
- **High Frequency Switching to 50KHz**
- **Ultra Low Leakage Current**

Combi (IGBT and Diode)



Unless stated otherwise, Microsemi discrete IGBTs contain a single IGBT die. This device is recommended for applications such as induction heating (IH), motor control, general purpose inverters and uninterruptible power supplies (UPS).

MAXIMUM RATINGS

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

Symbol	Parameter	Ratings	Unit
V_{ces}	Collector Emitter Voltage	1200	V
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	88	A
I_{C2}	Continuous Collector Current @ T_C = 100°C	40	
I_{CM}	Pulsed Collector Current ①	160	
SCWT	Short Circuit Withstand Time: V_{CE} = 600V, V_{GE} = 15V, T_C=125°C	10	μs
P_D	Total Power Dissipation @ T_C = 25°C	500	W
T_J,T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C
T_L	Max. Lead Temp. for Soldering: 0.063" from Case for 10 Sec.	300	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Parameter	Min	Typ	Max	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 1.0mA)	1200			Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 2.0mA, T_j = 25°C)	3	4.5	6.0	
$V_{CE(ON)}$	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 40A, T_j = 25°C)		2.5	3.2	
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 40A, T_j = 125°C)		3.5		
	Collector-Emitter On Voltage (V_{GE} = 15V, I_C = 88A, T_j = 25°C)		3.2		
I_{CES}	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 25°C) ②		20	1100	μA
	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 125°C) ②		200		
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)			±250	nA

CAUTION: These Devices are Sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

DYNAMIC CHARACTERISTICS

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	Capacitance		3980		pF
C_{oes}	Output Capacitance	V_{GE} = 0V, V_{CE} = 25V		320		
C_{res}	Reverse Transfer Capacitance	f = 1MHz		80		
V_{GEP}	Gate to Emitter Plateau Voltage	Gate Charge		7		V
Q_g (3)	Total Gate Charge	V_{GE} = 15V		210		nC
Q_{ge}	Gate-Emitter Charge	V_{CE}= 600V		25		
Q_{gc}	Gate- Collector Charge	I_C = 40A		90		
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C)		22		ns
t_r	Current Rise Time	V_{CC} = 600V		25		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		163		
t_f	Current Fall Time	I_C = 40A		40		
E_{on2} (5)	Turn-On Switching Energy	R_G = 4.3 Ω (4)		1375	3000	μJ
E_{off} (6)	Turn-Off Switching Energy	T_J = +25°C		906	1650	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C)		22		ns
t_r	Current Rise Time	V_{CC} = 600V		25		
$t_{d(off)}$	Turn-Off Delay Time	V_{GE} = 15V		185		
t_f	Current Fall Time	I_C = 40A		47		
E_{on2} (5)	Turn-On Switching Energy	R_G = 4.3 Ω (4)		1916	3500	μJ
E_{off} (6)	Turn-Off Switching Energy	T_J = +125°C		1186	2500	

THERMAL AND MECHANICAL CHARACTERISTICS

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case Thermal Resistance (IGBT)			.25	°C/W
	Junction to Case Thermal Resistance (Diode)			.80	
$R_{\theta JA}$	Junction to Ambient Thermal Resistance			40	
W_T	Package Weight		.22		oz
			6.2		g

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.

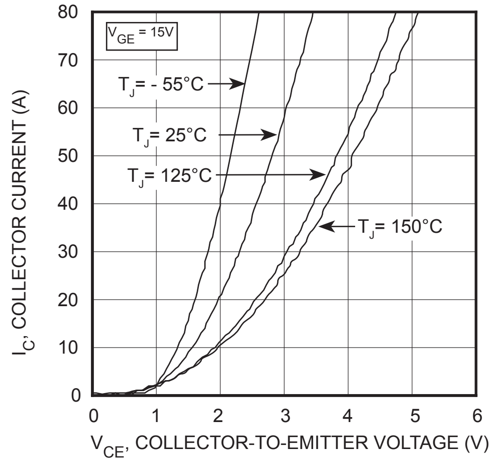


FIGURE 1, Output Characteristics (T_J = 25°C)

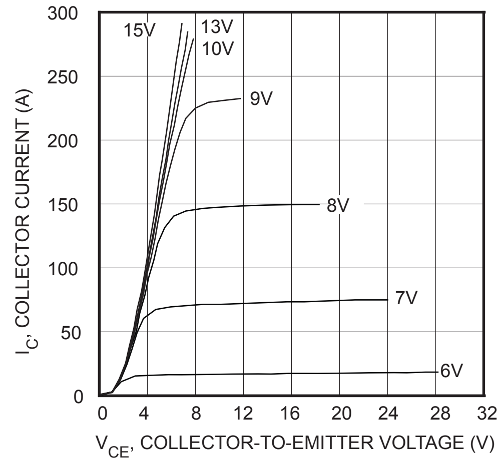


FIGURE 2, Output Characteristics (T_J = 25°C)

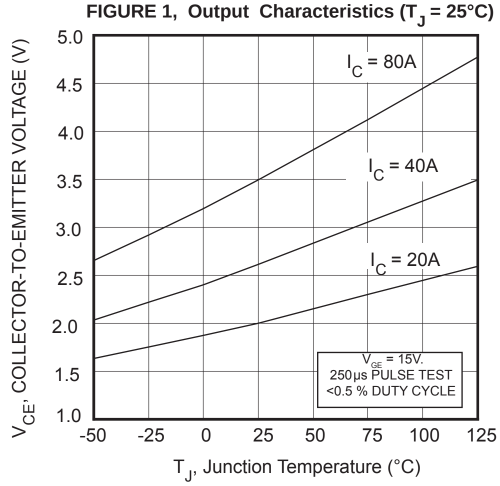


FIGURE 3, On State Voltage vs Junction Temperature

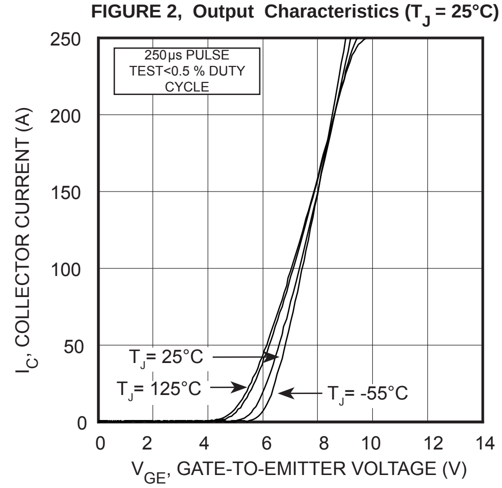


FIGURE 4, Transfer Characteristics

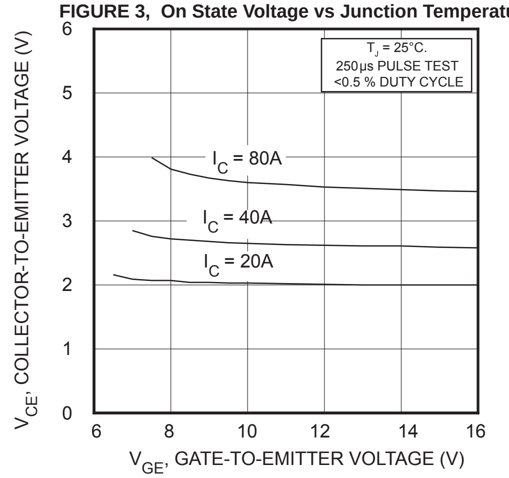


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

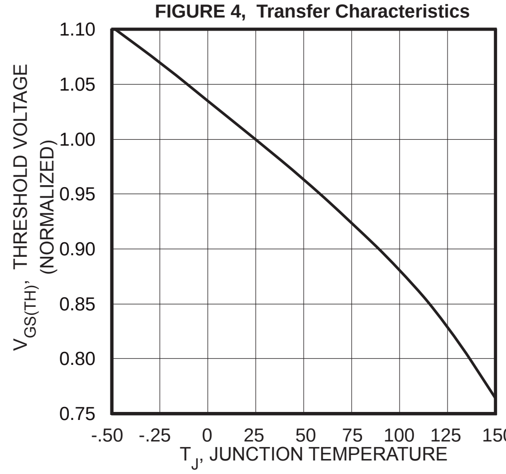


FIGURE 6, Threshold Voltage vs Junction Temperature

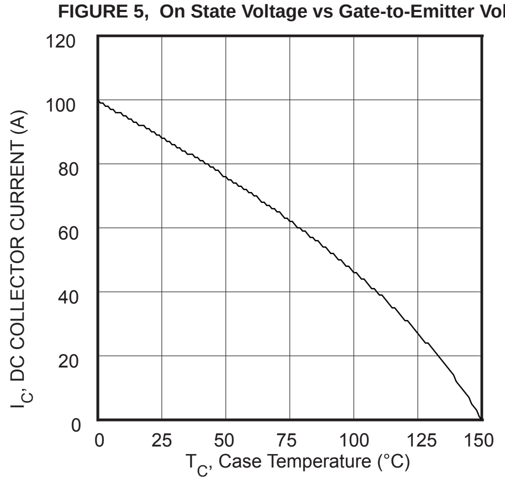


FIGURE 7, DC Collector Current vs Case Temperature

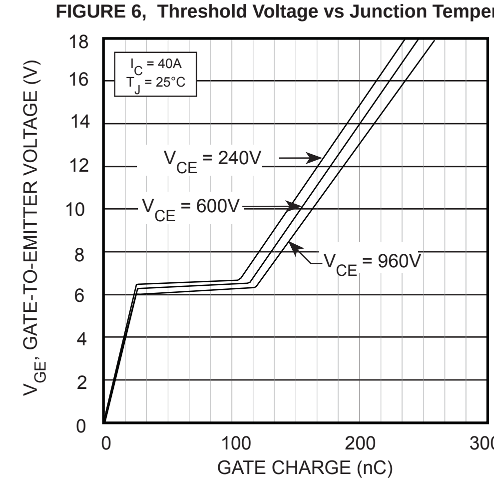


FIGURE 8, Gate charge

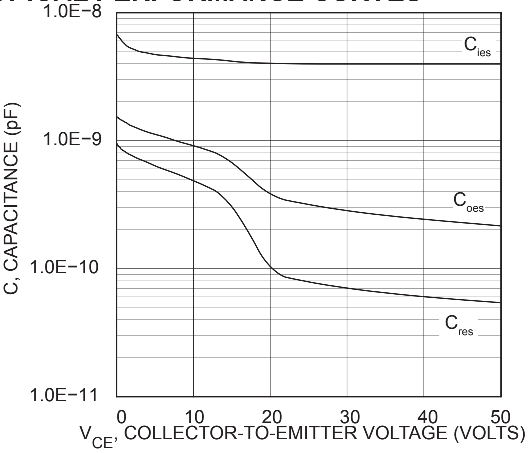


FIGURE 9, Capacitance vs Collector-To-Emitter Voltage

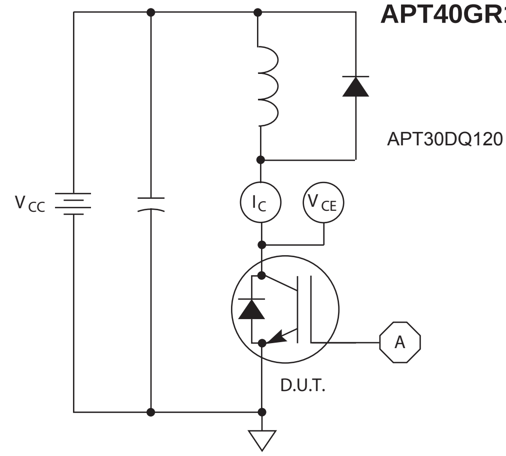


FIGURE 10, Inductive Switching Test Circuit

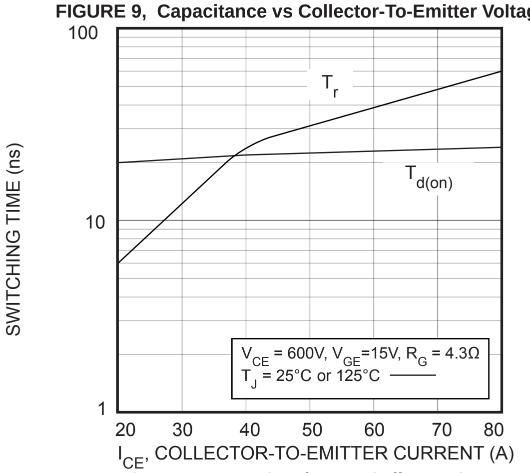


FIGURE 11, Turn-On Time vs Collector Current

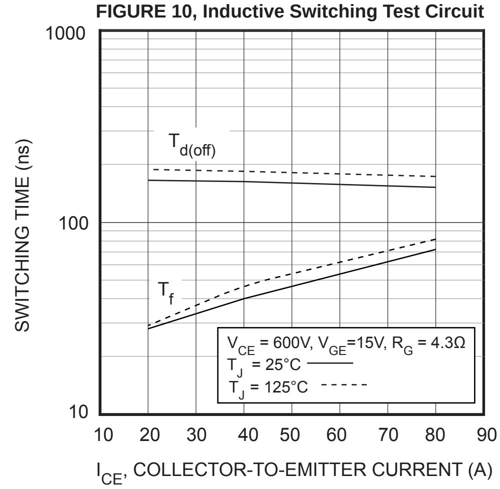


FIGURE 12, Turn-Off Time vs Collector Current

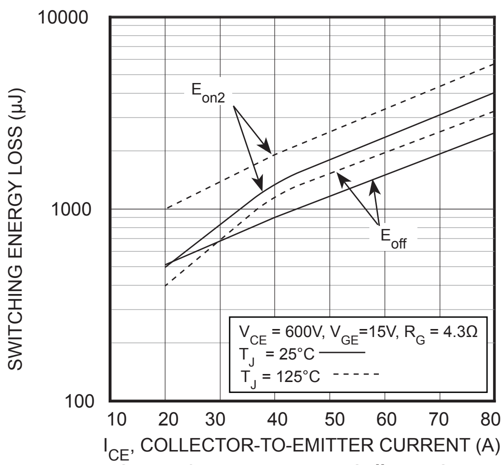


FIGURE 13, Energy Loss vs Collector Current

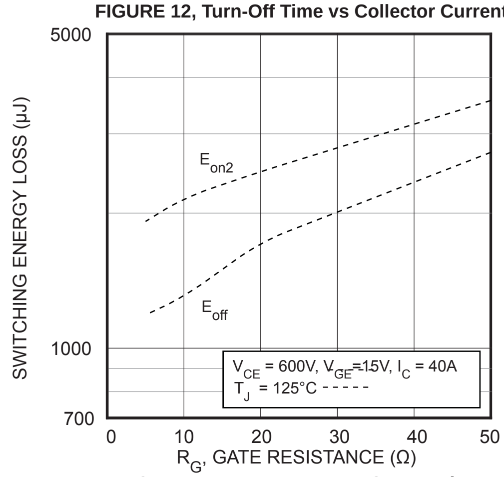


FIGURE 14, Energy Loss vs Gate Resistance

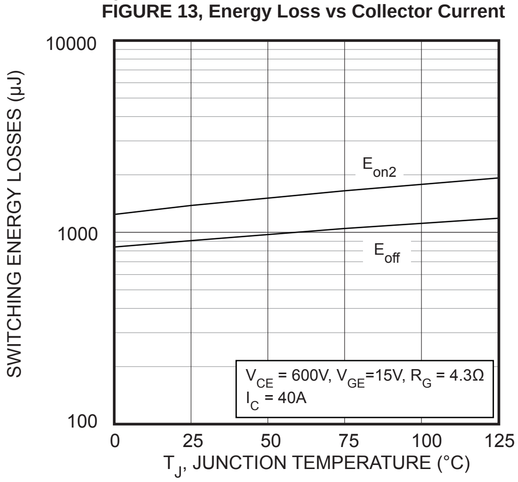


FIGURE 15, Energy Losses vs Junction Temperature

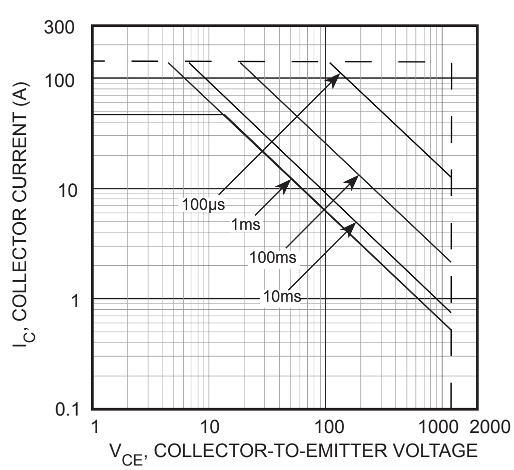


FIGURE 16, Minimum Switching Safe Operating Area

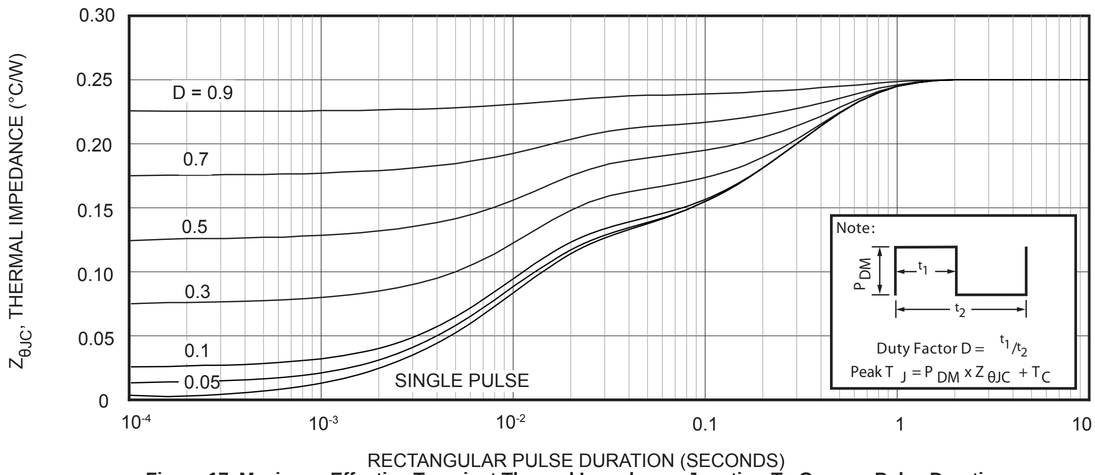


Figure 17, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

ULTRAFAST SOFT RECOVERY ANTI-PARALLEL DIODE

MAXIMUM RATINGS

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

Symbol	Characteristic / Test Conditions	APT40GR120B2D30	UNIT
$I_{F(AV)}$	Maximum Average Forward Current (T_C = 110°C, Duty Cycle = 0.5)	30	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	43	Amps
I_{FSM}	Non-Repetitive Forward Surge Current (T_J = 45°C, 8.3ms)	210	Amps

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions		MIN	TYP	MAX	UNIT
V_F	Forward Voltage	I_F = 30A		2.8		Volts
		I_F = 60A		3.4		
		I_F = 30A, T_J = 125°C		2.1		

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	-	26		ns
t_{rr}	Reverse Recovery Time	I_F = 30A, di_F/dt = -200A/µs V_R = 800V, T_C = 25°C	-	320		ns
Q_{rr}	Reverse Recovery Charge		-	545		nC
I_{RRM}	Maximum Reverse Recovery Current		-	4	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 30A, di_F/dt = -200A/µs V_R = 800V, T_C = 125°C	-	435		ns
Q_{rr}	Reverse Recovery Charge		-	2100		nC
I_{RRM}	Maximum Reverse Recovery Current		-	9	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 30A, di_F/dt = -1000A/µs V_R = 800V, T_C = 125°C	-	180		ns
Q_{rr}	Reverse Recovery Charge		-	2975		nC
I_{RRM}	Maximum Reverse Recovery Current		-	28		Amps

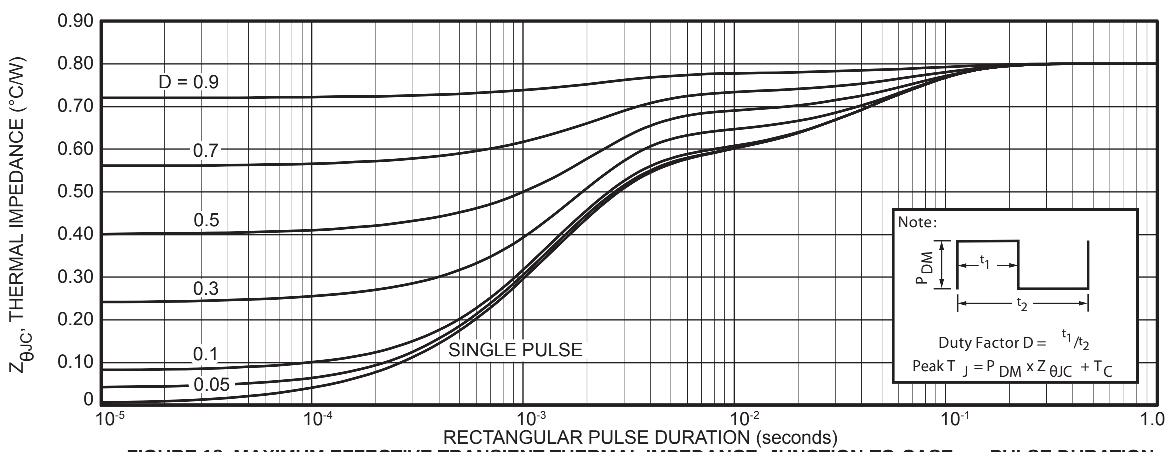


FIGURE 18. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

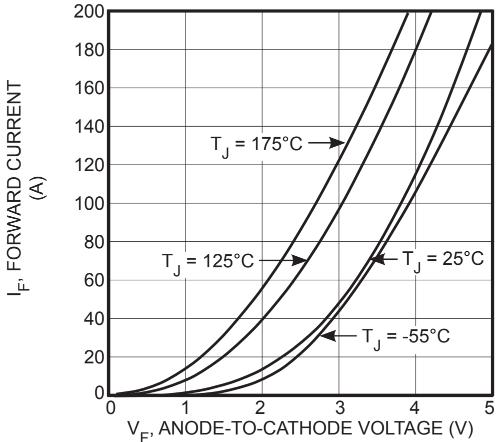


Figure 19. Forward Current vs. Forward Voltage

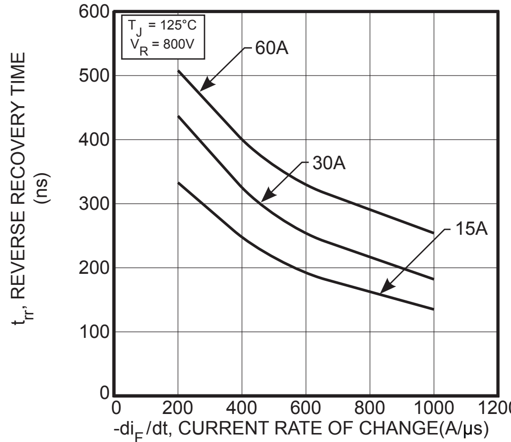


Figure 20. Reverse Recovery Time vs. Current Rate of Change

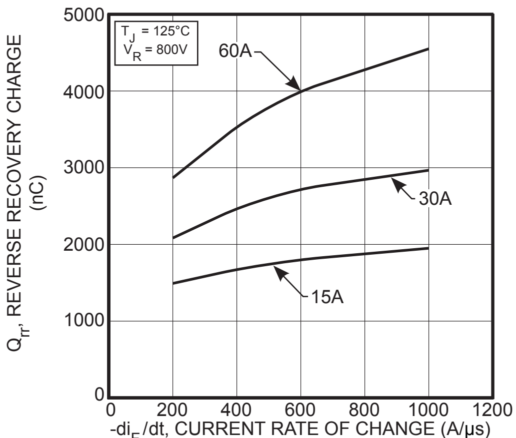


Figure 21. Reverse Recovery Charge vs. Current Rate of Change

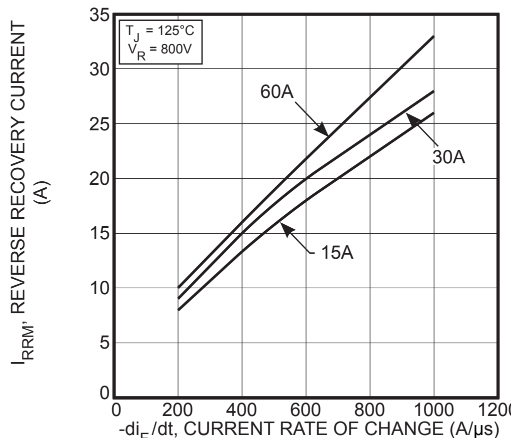


Figure 22. Reverse Recovery Current vs. Current Rate of Change

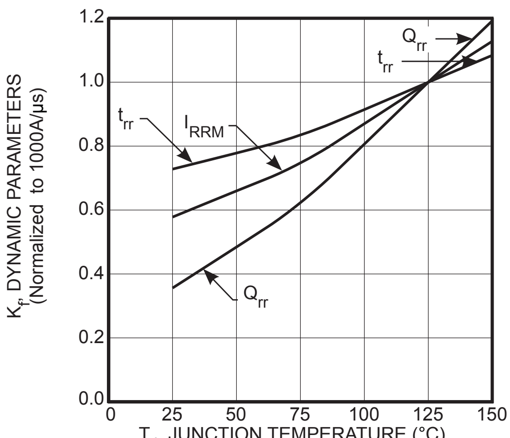


Figure 23. Dynamic Parameters vs. Junction Temperature

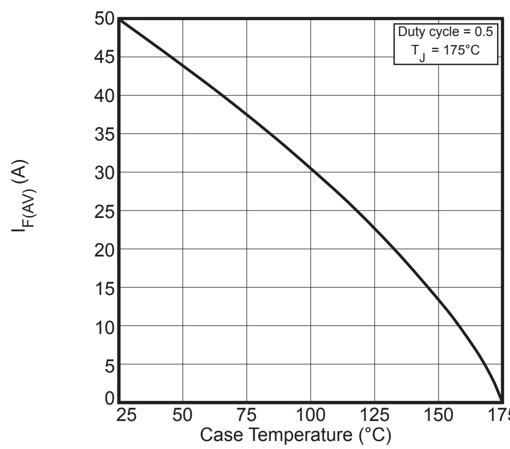


Figure 24. Maximum Average Forward Current vs. CaseTemperature

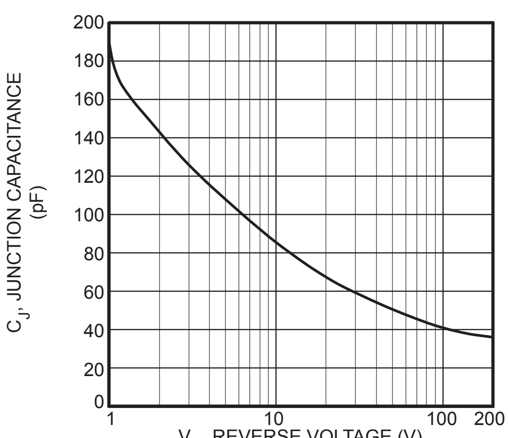


Figure 25. Junction Capacitance vs. Reverse Voltage

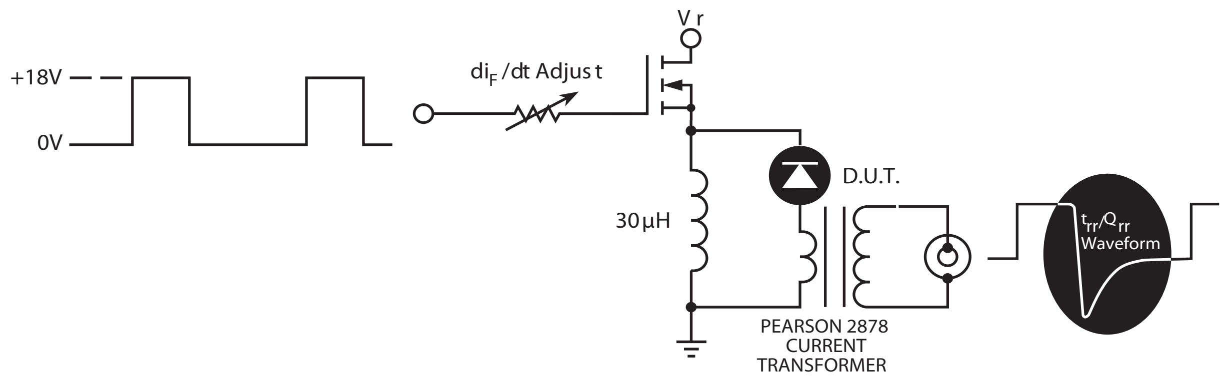


Figure 26. Diode Test Circuit

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 $t_{RR.}$

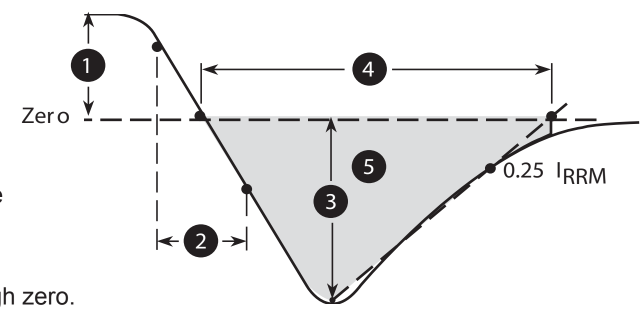
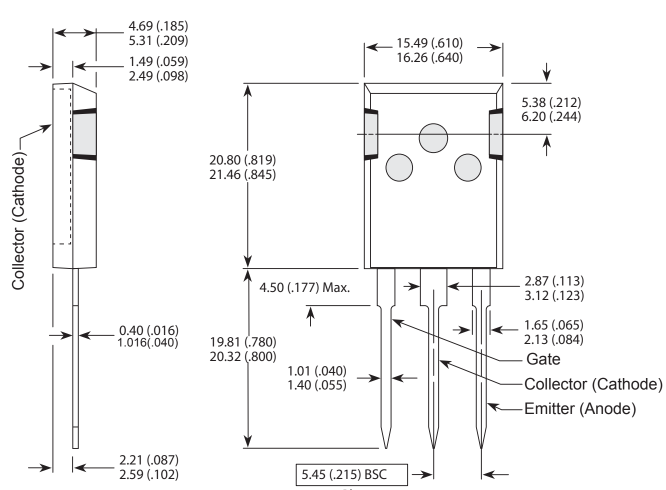


Figure 27. Diode Reverse Recovery Waveform Definition

T-MAX® (B2) Package Outline

e3 100% Sn Plated



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

Dimensions in Millimeters and (Inches)

OCEAN CHIPS

Океан Электроники

Поставка электронных компонентов

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

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- Поставка оригинальных импортных электронных компонентов напрямую с производств Америки, Европы и Азии, а так же с крупнейших складов мира;
- Широкая линейка поставок активных и пассивных импортных электронных компонентов (более 30 млн. наименований);
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Помощь Конструкторского Отдела и консультации квалифицированных инженеров;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Поставка электронных компонентов под контролем ВП;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- При необходимости вся продукция военного и аэрокосмического назначения проходит испытания и сертификацию в лаборатории (по согласованию с заказчиком);
- Поставка специализированных компонентов военного и аэрокосмического уровня качества (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Actel, Aeroflex, Peregrine, VPT, Syfer, Eurofarad, Texas Instruments, MS Kennedy, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

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«JONHON» (основан в 1970 г.)

Разъемы специального, военного и аэрокосмического назначения:

(Применяются в военной, авиационной, аэрокосмической, морской, железнодорожной, горно- и нефтедобывающей отраслях промышленности)

«FORSTAR» (основан в 1998 г.)

ВЧ соединители, коаксиальные кабели, кабельные сборки и микроволновые компоненты:

(Применяются в телекоммуникациях гражданского и специального назначения, в средствах связи, РЛС, а так же военной, авиационной и аэрокосмической отраслях промышленности).

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