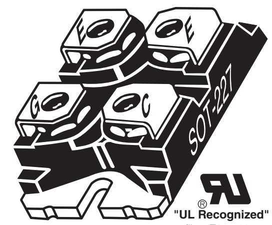
APT150GN120JDQ4

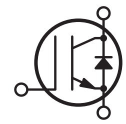
1200V, 150A, $V_{CE(ON)}$ = 3.2V Typical

Utilizing the latest Field Stop and Trench Gate technologies, these IGBT's have ultra low $V_{CE(ON)}$ and are ideal for low frequency applications that require absolute minimum conduction loss. Easy paralleling is a result of very tight parameter distribution and a slightly positive $V_{CE(ON)}$ temperature coefficient. A built-in gate resistor ensures extremely reliable operation, even in the event of a short cuircuit fault. Low gate charge simplifies gate drive design and minimizes losses.



ISOTOP®

- **1200V Field Stop**
- **Trench Gate: Low $V_{CE(ON)}$**
- **Easy Paralleling**
- **Integrated Gate Resistor: Low EMI, High Reliability**
- **RoHS Compliant**



Applications: Welding, Inductive Heating, Solar Inverters, SMPS, Motor drives, UPS

Maximum Ratings

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

Symbol	Parameter	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	1200	Volts
V_{GE}	Gate-Emitter Voltage	±30	
I_{C1}	Continuous Collector Current @ T_C = 25°C	215	Amps
I_{C2}	Continuous Collector Current @ T_C = 100°C	99	
I_{CM}	Pulsed Collector Current ①	450	
SSOA	Switching Safe Operating Area @ T_J = 150°C	450A @ 1200V	
P_D	Total Power Dissipation	625	Watts
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to 150	°C

Static Electrical Characteristics

Symbol	Characteristic / Test Conditions	Min	Typ	Max	Unit
$V_{(BR)CES}$	Collector-Emitter Breakdown Voltage (V_{GE} = 0V, I_C = 6mA)	1200	-	-	Volts
$V_{GE(TH)}$	Gate Threshold Voltage (V_{CE} = V_{GE}, I_C = 6mA, T_j = 25°C)	5.0	5.8	6.5	
$V_{CE(ON)}$	Collector Emitter On Voltage (V_{GE} = 15V, I_C = 150A, T_j = 25°C)	1.4	1.7	2.1	
	Collector Emitter On Voltage (V_{GE} = 15V, I_C = 150A, T_j = 125°C)	-	2.08	-	
I_{CES}	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 25°C) ②	-	-	300	μA
	Collector Cut-off Current (V_{CE} = 1200V, V_{GE} = 0V, T_j = 125°C) ②	-	-	TBD	
I_{GES}	Gate-Emitter Leakage Current (V_{GE} = ±20V)	-	-	600	nA
$R_{G(int)}$	Integrated Gate Resistor	-	5	-	Ω

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

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Dynamic Characteristic

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{ies}	Input Capacitance	V_{GE} = 0V, V_{CE} = 25V f = 1MHz	-	9500	-	pF
C_{oes}	Output Capacitance		-	500	-	
C_{res}	Reverse Transfer Capacitance		-	400	-	
V_{GEP}	Gate-to-Emitter Plateau Voltage	Gate Charge V_{GE} = 15V V_{CE}= 600V I_C = 150A	-	9.5	-	V
Q_g	Total Gate Charge ③		-	800	-	nC
Q_{ge}	Gate-Emitter Charge		-	70	-	
Q_{gc}	Gate-Collector Charge		-	430	-	
SSOA	Switching Safe Operating Area	T_J = 150°C, R_G = 1.0Ω ⑦, V_{GE} = 15V, L = 100µH, V_{CE}= 1200V	450			A
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (25°C) V_{CC} = 800V V_{GE} = 15V I_C = 150A R_G = 1.0Ω ⑦ T_J = +25°C	-	55	-	ns
t_r	Current Rise Time		-	65	-	
$t_{d(off)}$	Turn-Off Delay Time		-	675	-	
t_f	Current Fall Time		-	85	-	
E_{on1}	Turn-On Switching Energy ④		-	22	-	µJ
E_{on2}	Turn-On Switching Energy ⑤		-	27	-	
E_{off}	Turn-Off Switching Energy ⑥		-	15	-	
$t_{d(on)}$	Turn-On Delay Time	Inductive Switching (125°C) V_{CC} = 800V V_{GE} = 15V I_C = 150A R_G = 1.0Ω ⑦ T_J = +125°C	-	55	-	ns
t_r	Current Rise Time		-	65	-	
$t_{d(off)}$	Turn-Off Delay Time		-	780	-	
t_f	Current Fall Time		-	175	-	
E_{on1}	Turn-On Switching Energy ④		-	23	-	mJ
E_{on2}	Turn-On Switching Energy ⑤		-	35	-	
E_{off}	Turn-Off Switching Energy ⑥		-	22	-	

Thermal and Mechanical Characteristics

Symbol	Characteristic / Test Conditions	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction to Case **(IGBT)**	-	-	0.20	°C/W
$R_{\theta JC}$	Junction to Case **(DIODE)**	-	-	0.56	
W_T	Package Weight	-	29.2	-	g
Torque	Terminals and Mounting Screws.	-	-	10	in·lbf
		-	-	1.1	N·m
$V_{Isolation}$	RMS Voltage (50-60Hz Sinusoidal Waveform from Terminals to Mounting Base for 1 Min.)	2500	-	-	Volts

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

② For Combi devices, I_{ces} includes both IGBT and FRED leakages.

③ See MIL-STD-750 Method 3471.

④ E_{on1} is the clamped inductive turn-on energy of the IGBT only, without the effect of a commutating diode reverse recovery current adding to z a the IGBT turn-on loss. Tested in inductive switching test circuit shown in figure 21, but with a Silicon Carbide diode.

⑤ E_{on2} is the clamped inductive turn-on energy that includes a commutating diode reverse recovery current in the IGBT turn-on switching loss. (See Figures 21, 22.)

⑥ E_{off} is the clamped inductive turn-off energy measured in accordance with JEDEC standard JESD24-1. (See Figures 21, 23.)

⑦ R_G is external gate resistance not including gate driver impedance.

Microsemi reserves the right to change, without notice, the specifications and information contained herein.

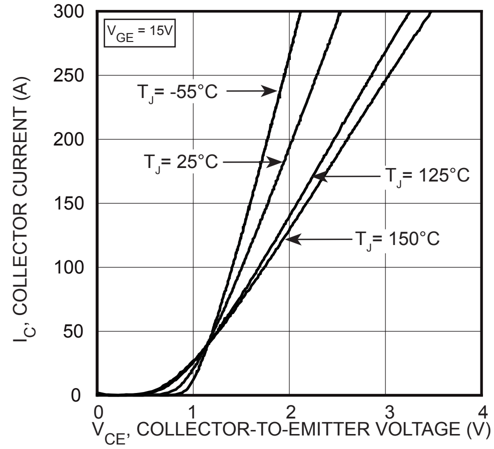


FIGURE 1, Output Characteristics (T_J = 25°C)

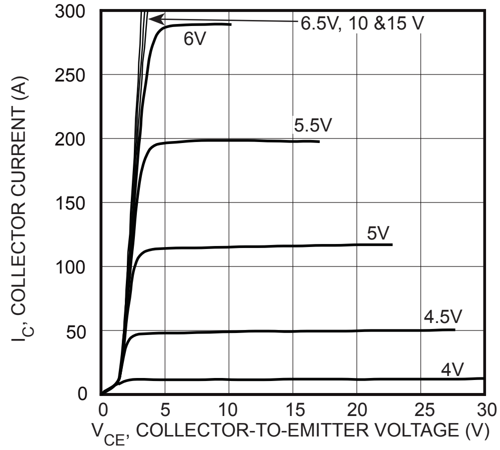


FIGURE 2, Output Characteristics (T_J = 25°C)

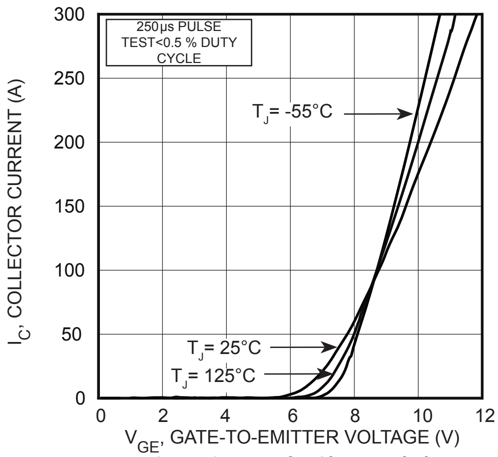


FIGURE 3, Transfer Characteristics

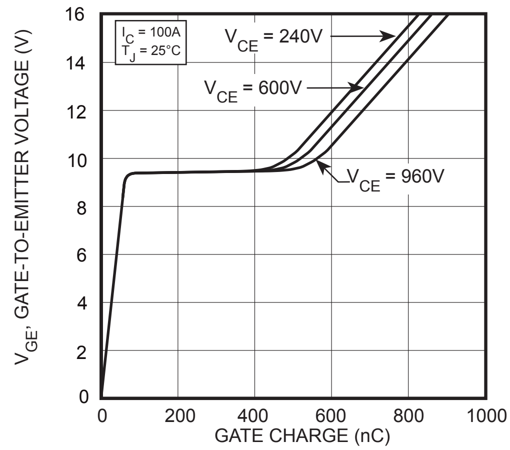


FIGURE 4, Gate charge

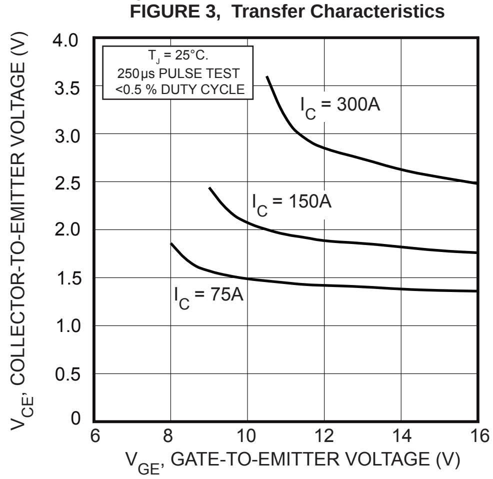


FIGURE 5, On State Voltage vs Gate-to-Emitter Voltage

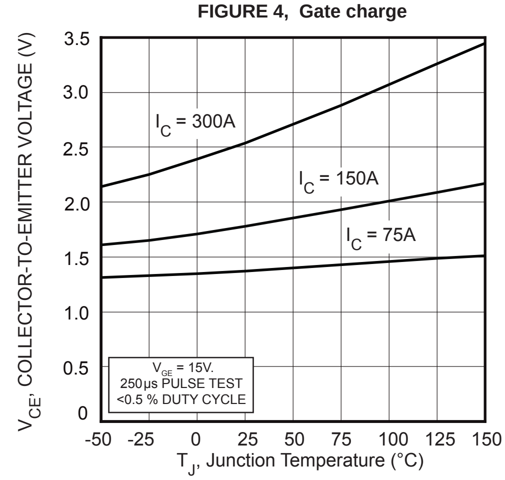


FIGURE 6, On State Voltage vs Junction Temperature

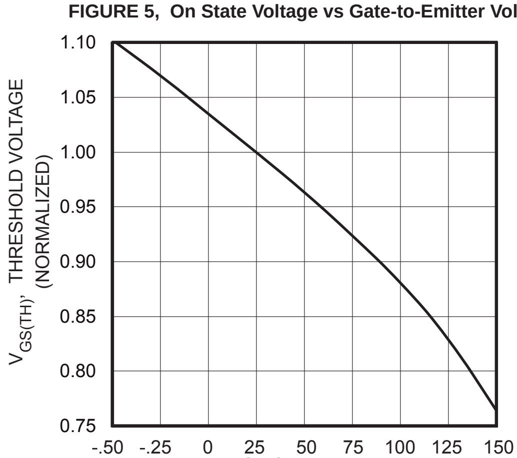


FIGURE 7, Threshold Voltage vs Junction Temperature

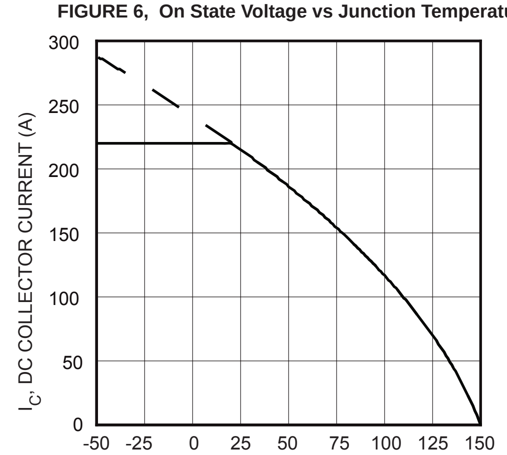


FIGURE 8, DC Collector Current vs Case Temperature

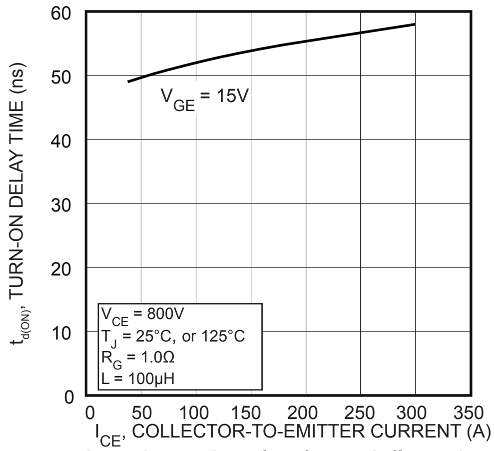


FIGURE 9, Turn-On Delay Time vs Collector Current

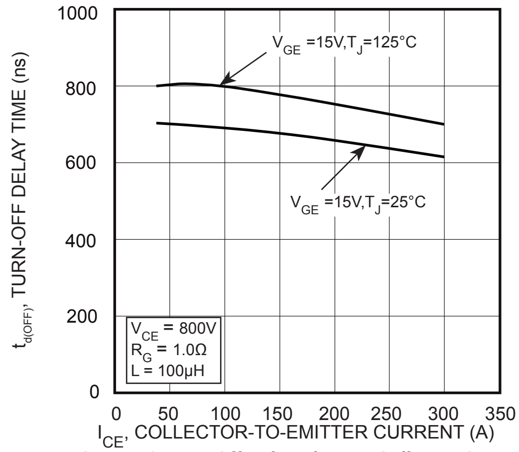


FIGURE 10, Turn-Off Delay Time vs Collector Current

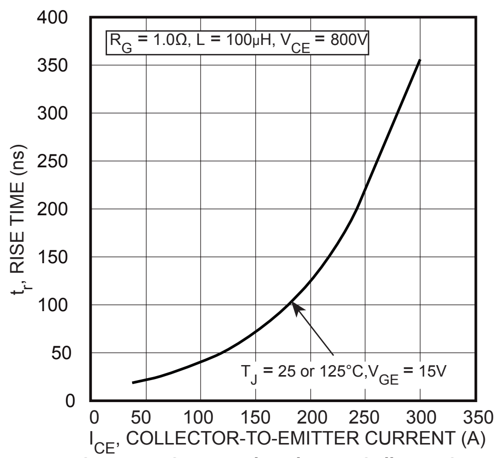


FIGURE 11, Current Rise Time vs Collector Current

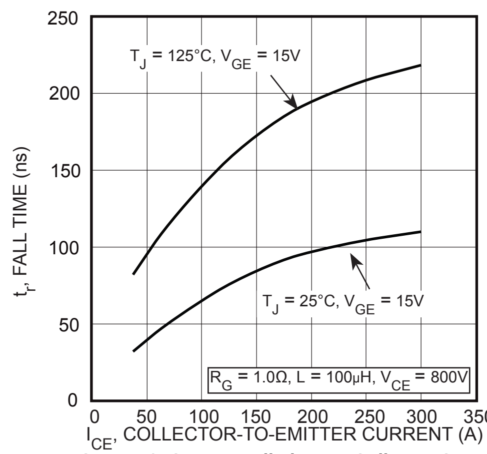


FIGURE 12, Current Fall Time vs Collector Current

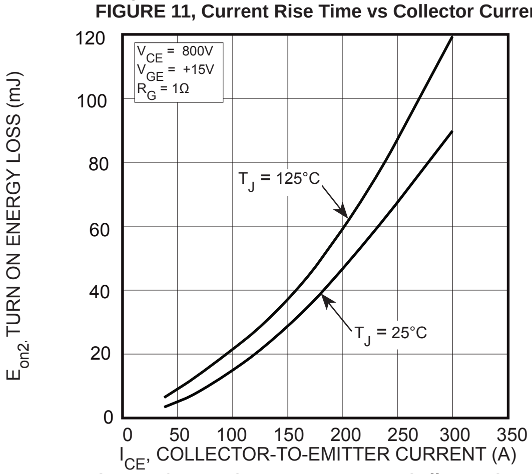


FIGURE 13, Turn-On Energy Loss vs Collector Current

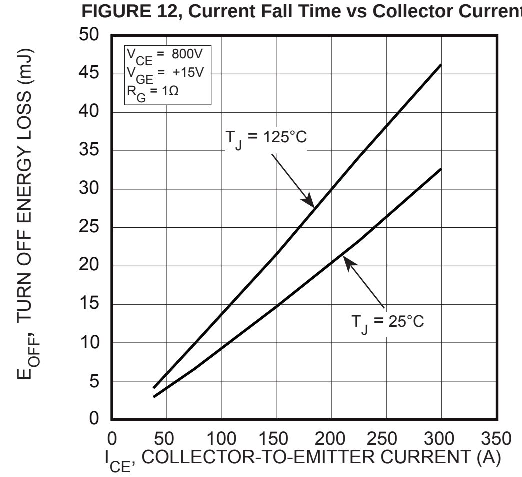


FIGURE 14, Turn-Off Energy Loss vs Collector Current

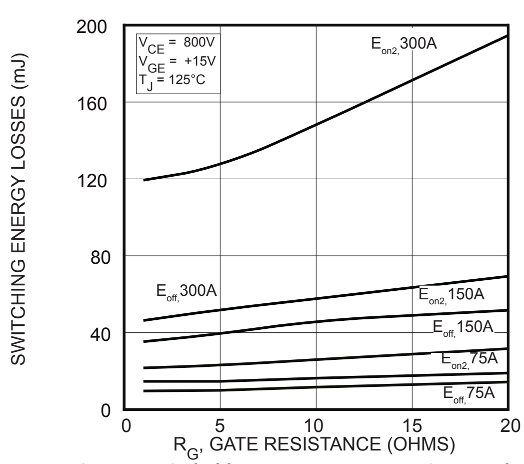


FIGURE 15, Switching Energy Losses vs Gate Resistance

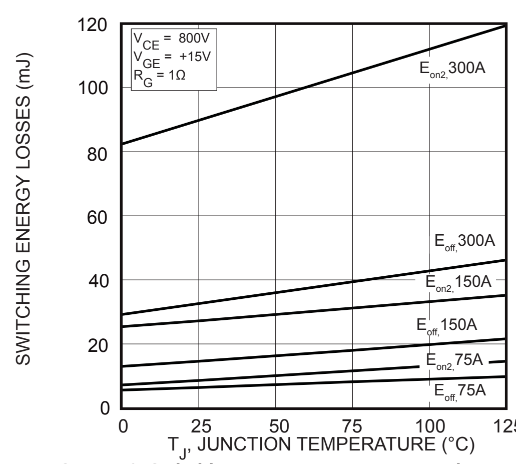


FIGURE 16, Switching Energy Losses vs Junction Temperature

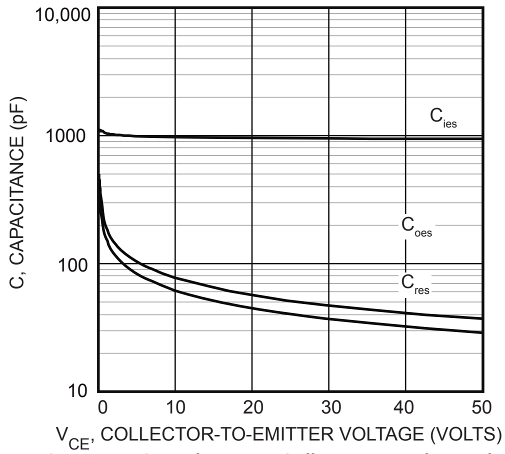


FIGURE 17, Capacitance vs Collector-To-Emitter Voltage

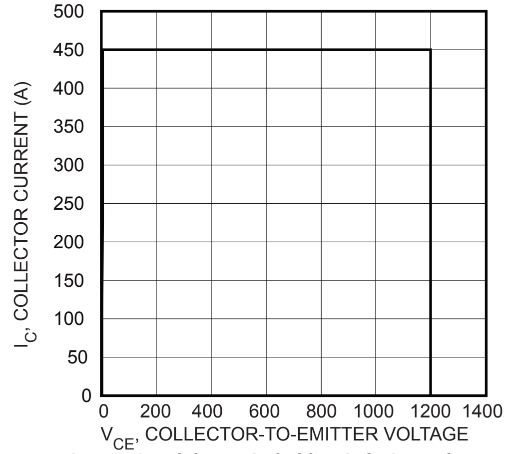


FIGURE 18, Minimum Switching Safe Operating Area

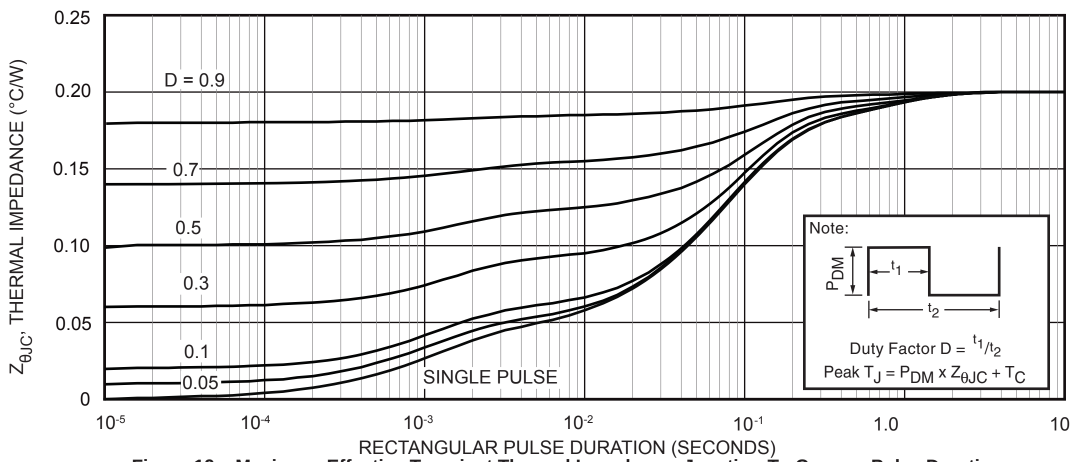


Figure 19a, Maximum Effective Transient Thermal Impedance, Junction-To-Case vs Pulse Duration

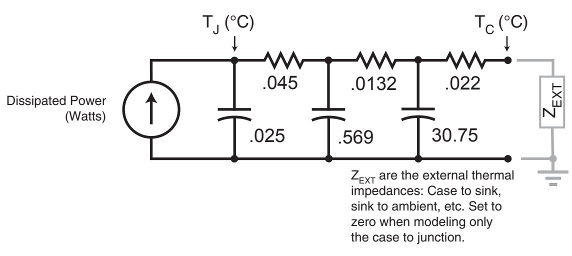
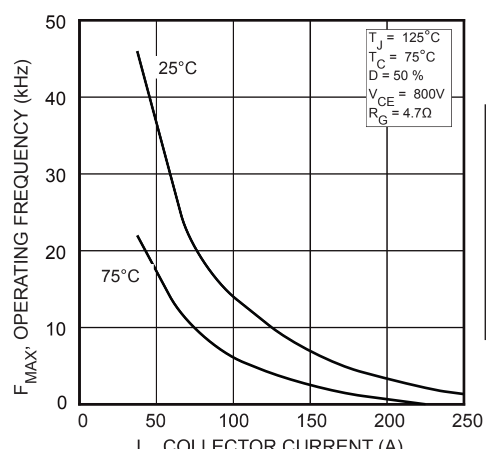


FIGURE 19b, TRANSIENT THERMAL IMPEDANCE MODEL



$$F_{max} = \min(f_{max}, f_{max2})$$

$$f_{max1} = \frac{0.05}{t_{d(on)} + t_r + t_{d(off)} + t_f}$$

$$f_{max2} = \frac{P_{diss} - P_{cond}}{E_{on2} + E_{off}}$$

$$P_{diss} = \frac{T_J - T_C}{R_{\theta JC}}$$

Figure 20, Operating Frequency vs Collector Current

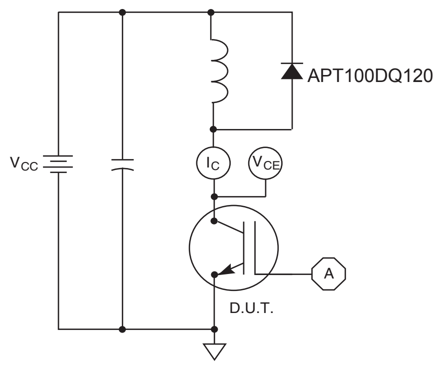


Figure 21, Inductive Switching Test Circuit

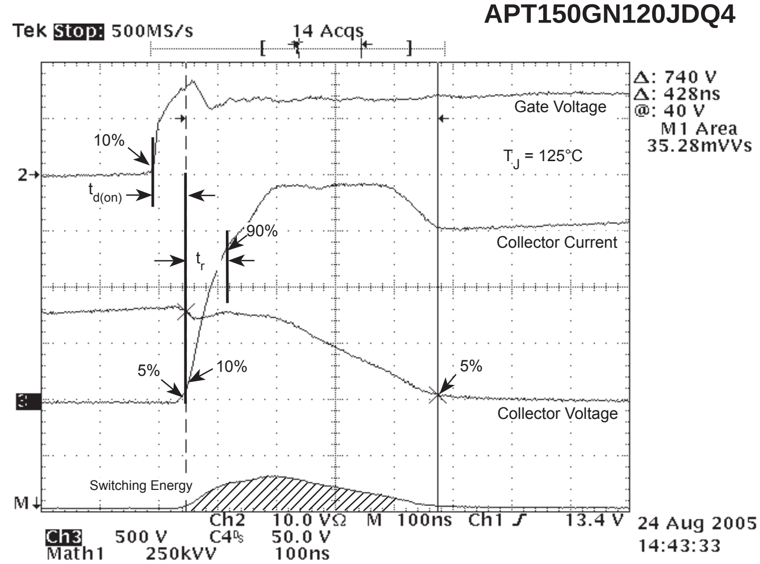


Figure 22, Turn-on Switching Waveforms and Definitions

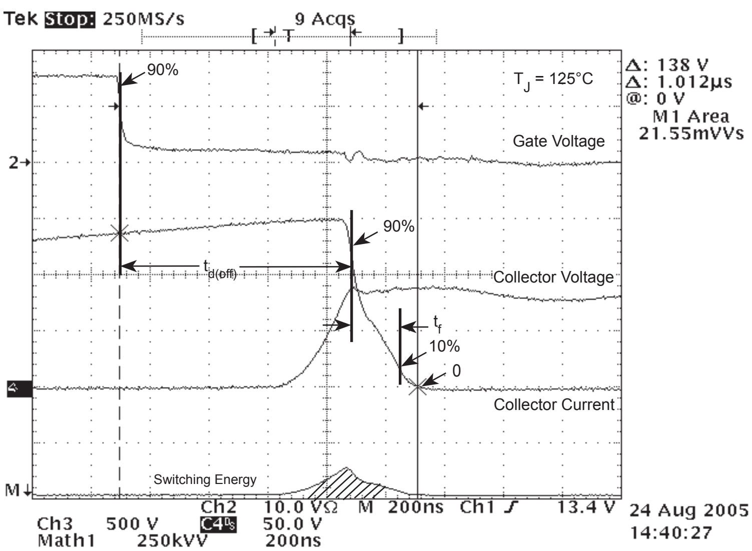


Figure 23, Turn-off Switching Waveforms and Definitions

ULTRAFAST SOFT RECOVERY ANTI-PARALLEL DIODE

MAXIMUM RATINGS

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

Symbol	Characteristic / Test Conditions	APT150GN120JRDQ4	Unit
$I_{F(AV)}$	Maximum Average Forward Current (T_C = 88°C, Duty Cycle = 0.5)	60	Amps
$I_{F(RMS)}$	RMS Forward Current (Square wave, 50% duty)	73	
I_{FSM}	Non-Repetitive Forward Surge Current (T_J = 45°C, 8.3 ms)	540	

STATIC ELECTRICAL CHARACTERISTICS

Symbol	Characteristic / Test Conditions		Min	Type	Max	Unit
V_F	Forward Voltage	I_F = 75A		2.7		Volts
		I_F = 150A		3.4		
		I_F = 75A, 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	-	60	-	ns
t_{rr}	Reverse Recovery Time	I_F = 60A, di_F/dt = -200A/µs V_R = 800V, T_C = 25°C	-	265	-	
Q_{rr}	Reverse Recovery Charge		-	560	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	5	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 60A, di_F/dt = -200A/µs V_R = 800V, T_C = 125°C	-	350	-	ns
Q_{rr}	Reverse Recovery Charge		-	2890	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	13	-	Amps
t_{rr}	Reverse Recovery Time	I_F = 60A, di_F/dt = -1000A/µs V_R = 800V, T_C = 125°C	-	150	-	ns
Q_{rr}	Reverse Recovery Charge		-	4720	-	nC
I_{RRM}	Maximum Reverse Recovery Current		-	40	-	Amps

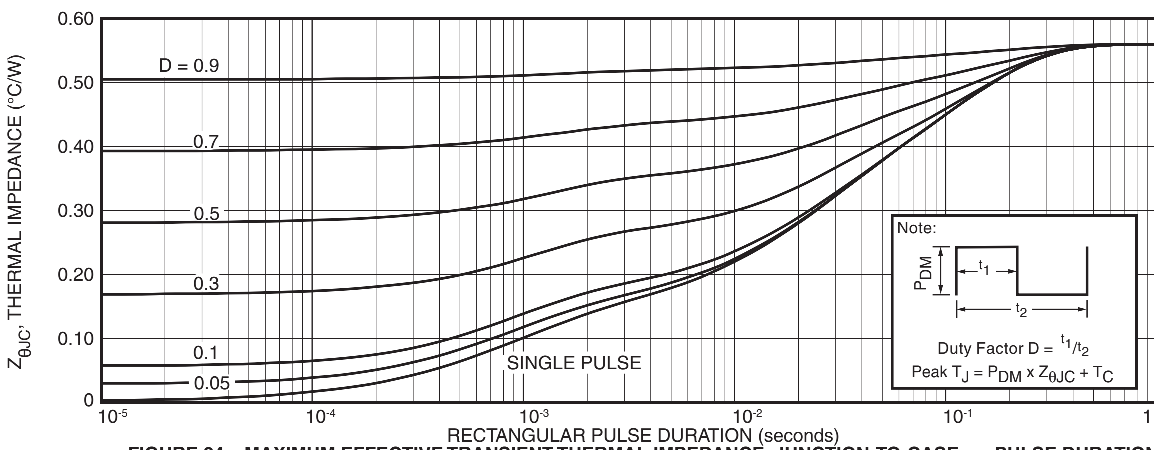


FIGURE 24a. MAXIMUM EFFECTIVE TRANSIENT THERMAL IMPEDANCE, JUNCTION-TO-CASE vs. PULSE DURATION

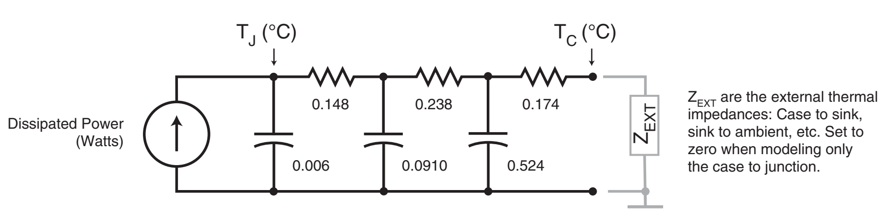


FIGURE 24b, TRANSIENT THERMAL IMPEDANCE MODEL

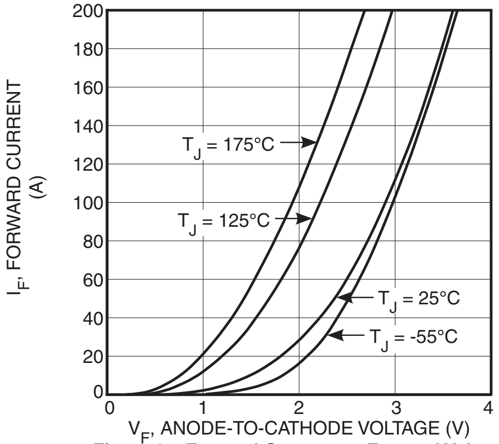


Figure 25. Forward Current vs. Forward Voltage

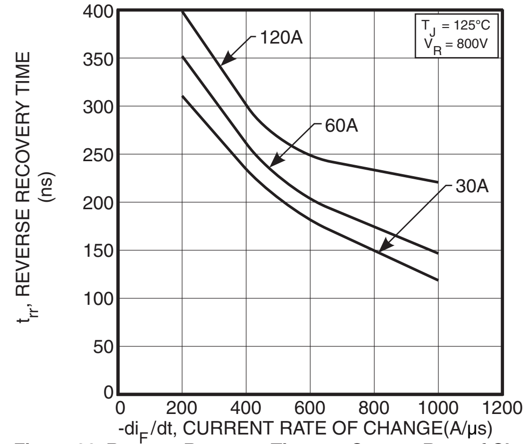


Figure 26. Reverse Recovery Time vs. Current Rate of Change

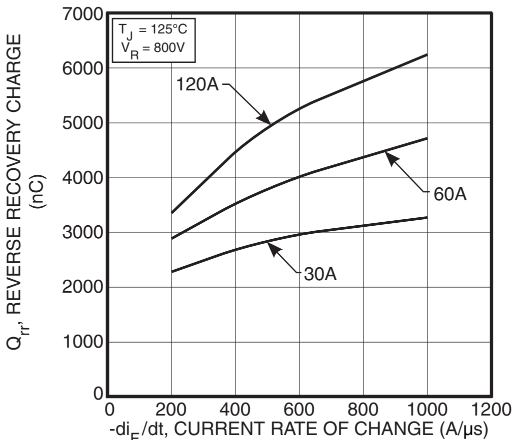


Figure 27. Reverse Recovery Charge vs. Current Rate of Change

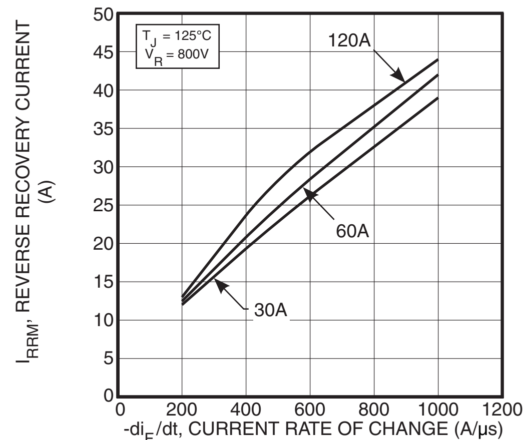


Figure 28. Reverse Recovery Current vs. Current Rate of Change

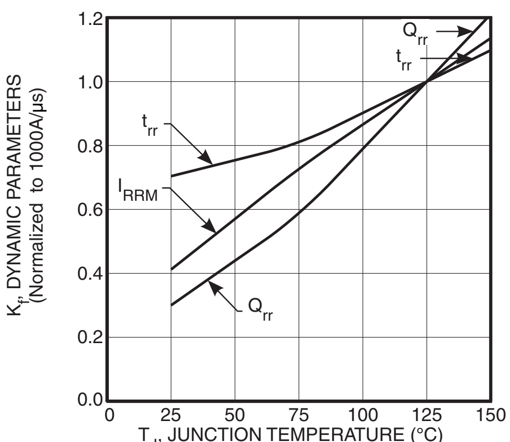


Figure 29. Dynamic Parameters vs. Junction Temperature

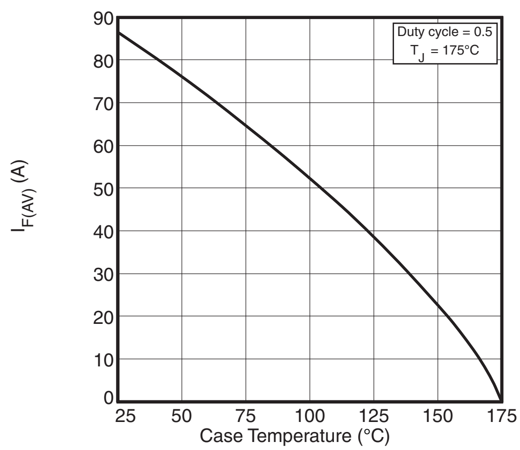


Figure 30. Maximum Average Forward Current vs. CaseTemperature

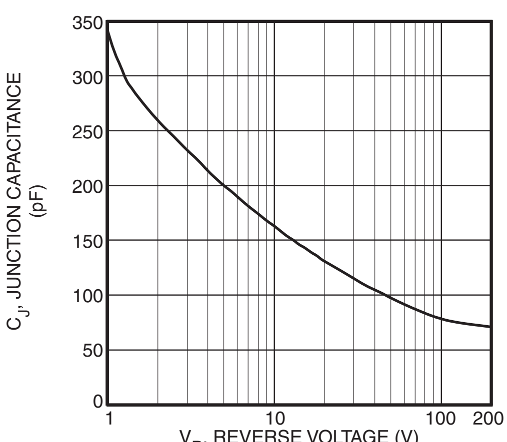


Figure 31. Junction Capacitance vs. Reverse Voltage

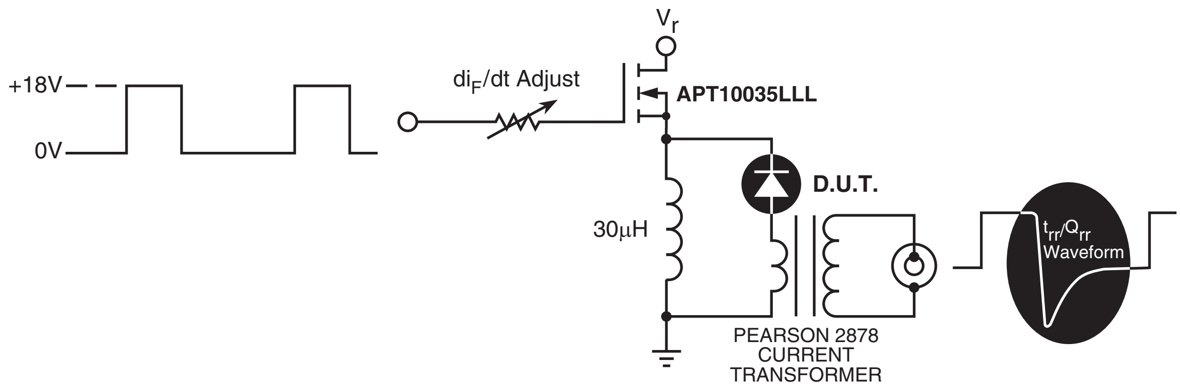


Figure 32, Diode Test Circuit

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 $0.25 \bullet I_{RRM}$ passes through zero.
5. Q_{rr} - Area Under the Curve Defined by I_{RRM} and t_{rr}.

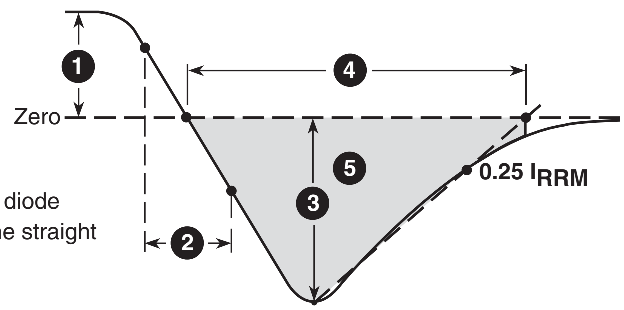
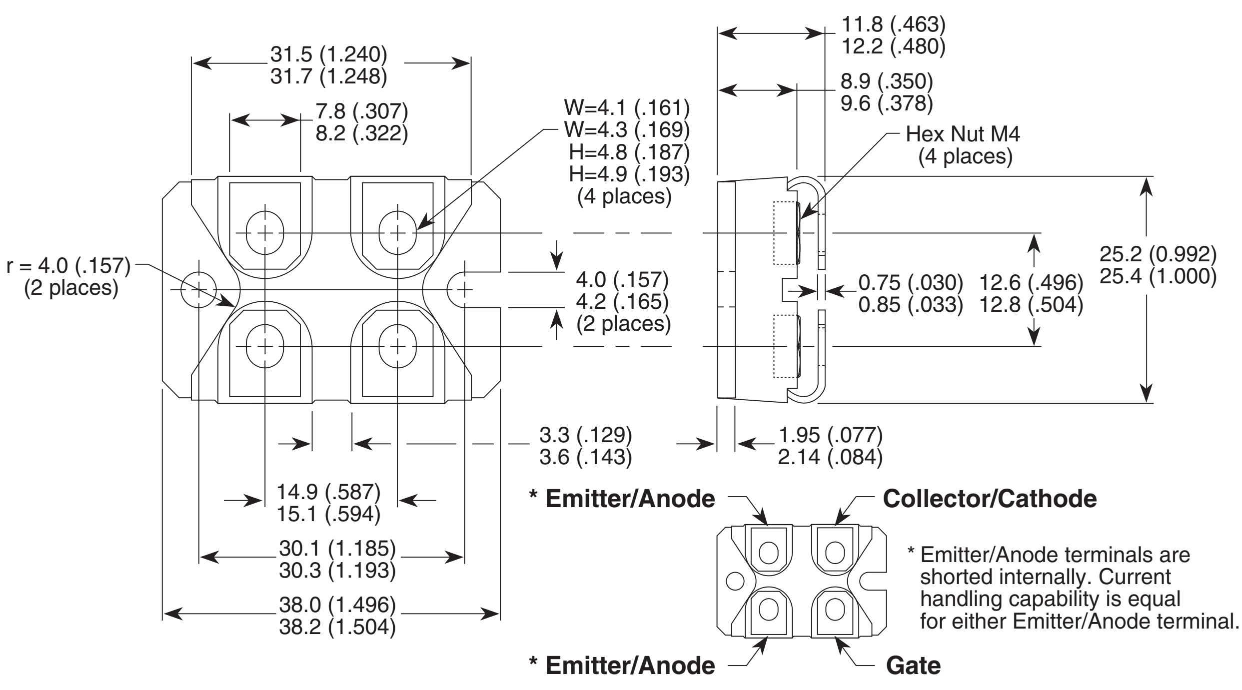


Figure 33, Diode Reverse Recovery Waveform and Definitions

SOT-227 (ISOTOP®) Package Outline



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!

Наши преимущества:

- 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.);

Компания «Океан Электроники» является официальным дистрибьютором и эксклюзивным представителем в России одного из крупнейших производителей разъемов военного и аэрокосмического назначения **«JONHON»**, а так же официальным дистрибьютором и эксклюзивным представителем в России производителя высокотехнологичных и надежных решений для передачи СВЧ сигналов **«FORSTAR»**.

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