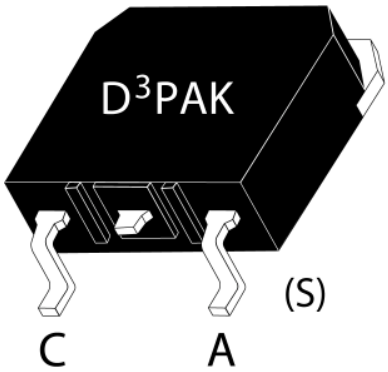
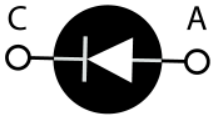
APT75DQ60SG Ultrafast Soft Recovery Rectifier Diode

1 Product Overview

This section outlines the product overview for the APT75DQ60SG device.





C—Cathode
A—Anode
Back of Case—Cathode

1.1 Features

The following are key features of the APT75DQ60SG device:

- Ultrafast recovery times
- Soft recovery characteristics
- Low forward voltage
- Low leakage current
- Avalanche energy rated
- RoHS compliant

1.2 Benefits

The following are benefits of the APT75DQ60SG device:

- High switching frequency
- Low switching losses
- Low noise (EMI) switching
- Higher reliability systems
- Increased system power density

1.3 Applications

The APT75DQ60SG device is designed for the following applications:

- Power factor correction (PFC)
- Anti-parallel diode
  - Switch-mode power supply
  - Inverters/converters
  - Motor controllers
- Freewheeling diode
  - Switch-mode power supply
  - Inverters/converters
- Snubber/clamp diode

2 Electrical Specifications

This section shows the electrical specifications for the APT75DQ60SG device.

2.1 Absolute Maximum Ratings

The following table lists the absolute maximum ratings for the APT75DQ60SG device.

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

Table 1 • Absolute Maximum Ratings

Symbol	Parameter	Ratings	Unit
V_R	Maximum DC reverse voltage	600	V
V_{RRM}	Maximum peak repetitive reverse voltage	600	
V_{RWM}	Maximum working peak reverse voltage	600	
$I_{F(AV)}$	Maximum average forward current (T_C = 108 °C, duty cycle = 0.5)	75	A
$I_{F(RMS)}$	RMS forward current	117	
I_{FSM}	Non-repetitive forward surge current (T_J = 45 °C, 8.3 ms)	600	
E_{AVL}	Avalanche energy (1 A, 40 mH)	20	mJ
T_J , T_{STG}	Operating and storage temperature range	–55 to 175	°C
T_L	Lead temperature for 10 seconds	300	

The following table shows the thermal and mechanical characteristics of the APT75DQ60SG device.

Table 2 • Thermal and Mechanical Characteristics

Symbol	Characteristic	Min	Typ	Max	Unit
$R_{\theta JC}$	Junction-to-case thermal resistance			0.34	°C/W
Wt	Package weight		0.14		oz
			4.0		g

2.2 Electrical Performance

The following table lists the static characteristics of the APT75DQ60SG device.

Table 3 • Static Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_F	Forward voltage	I_F = 75 A		2.0	2.5	V
		I_F = 150 A		2.4		
		I_F = 75 A, T_J = 125 °C		1.7		
I_{RM}	Maximum reverse leakage current	V_R = 600 V			25	µA
		V_R = 600 V, T_J = 125 °C			500	
C_J	Junction capacitance	V_R = 200 V		110		pF

2.3 Dynamic Characteristics

The following table lists the dynamic characteristics of the APT75DQ60SG device.

Table 4 • Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
t_{rr}	Reverse recovery time	I_F = 1 A di_F/dt = –100 A/µs V_R = 30 V T_J = 25 °C		29		ns
t_{rr}	Reverse recovery time	I_F = 75 A di_F/dt = –200 A/µs V_R = 400 V T_C = 25 °C		31		
Q_{rr}	Reverse recovery change			55		nC
I_{RRM}	Maximum reverse recovery current			4		A
t_{rr}	Reverse recovery time	I_F = 75 A di_F/dt = –200 A/µs V_R = 400 V T_C = 125 °C		140		ns
Q_{rr}	Reverse recovery charge			650		nC
I_{RRM}	Maximum reverse recovery current			9		A
t_{rr}	Reverse recovery time	I_F = 75 A di_F/dt = –1000 A/µs V_R = 400 V T_C = 125 °C		90		ns
Q_{rr}	Reverse recovery change			1300		nC
I_{RRM}	Maximum reverse recovery current			27		A

2.4 Typical Performance Curves

This section shows the typical performance curves for the APT75DQ60SG device.

Figure 1 • Maximum Transient Thermal Impedance

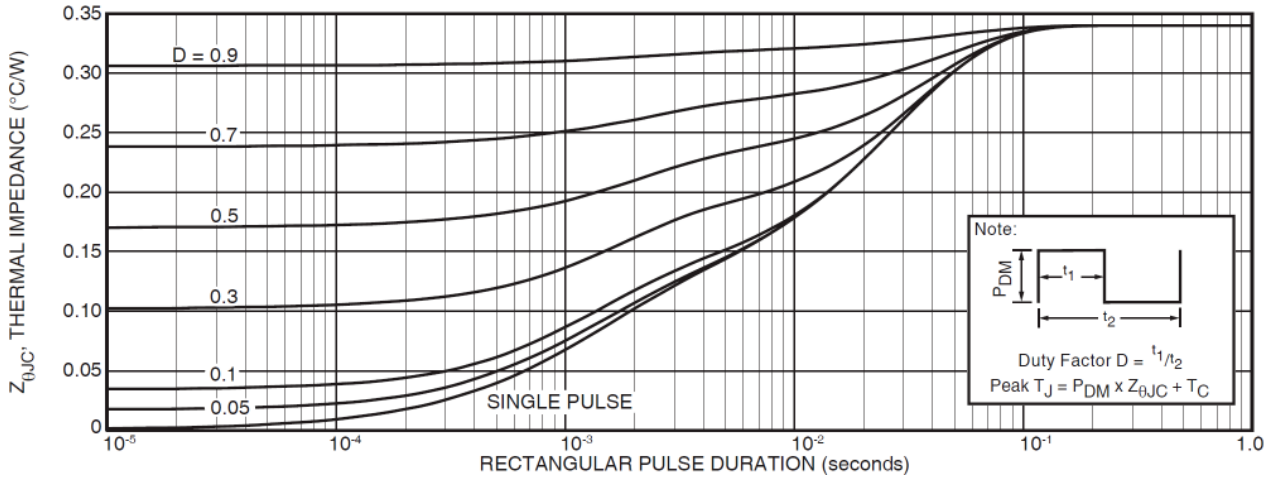


Figure 2 • Forward Current vs. Forward Voltage

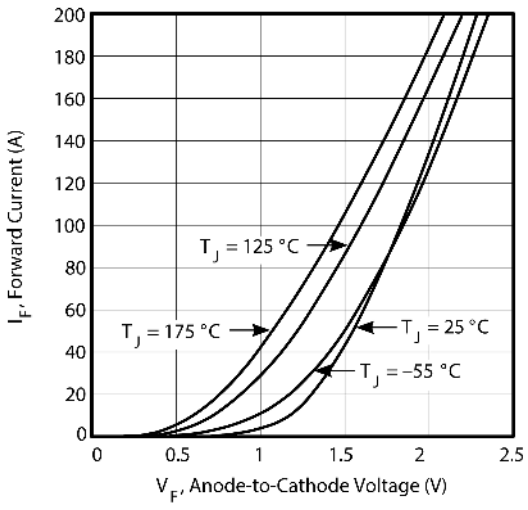


Figure 3 • RRT vs. Current Rate of Change

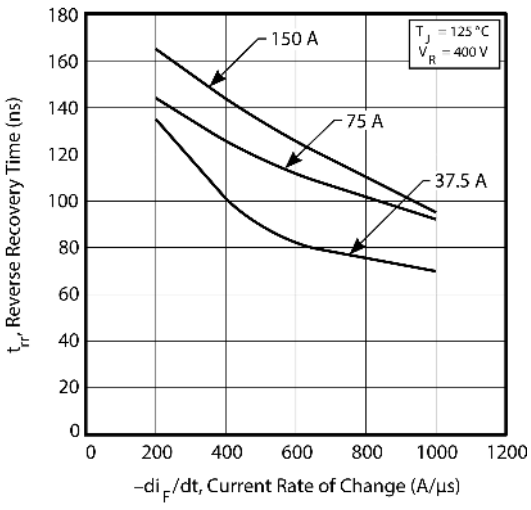


Figure 4 • Reverse Recovery Charge vs. Current Rate of Change

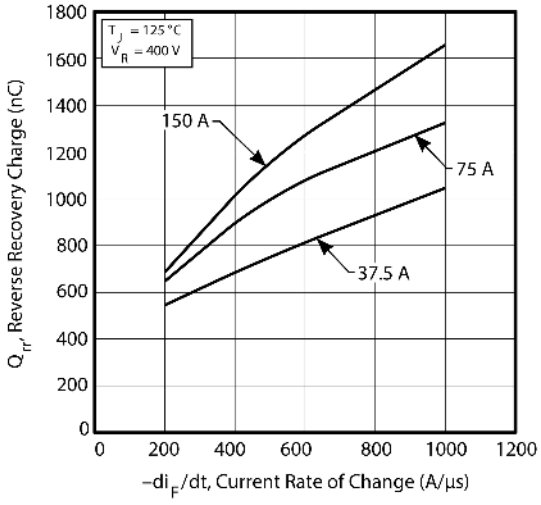


Figure 5 • Reverse Recovery Current vs. Current Rate of Change

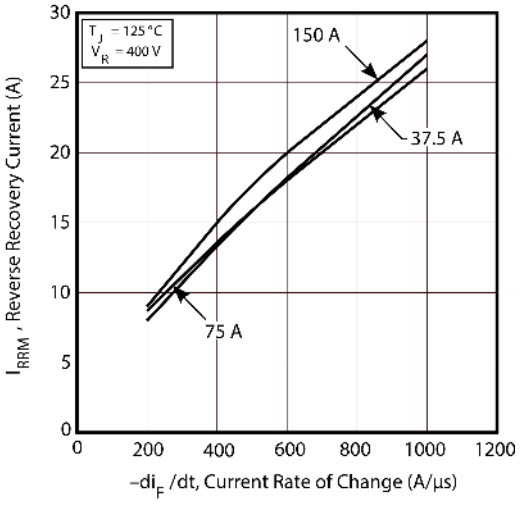


Figure 6 • Dynamic Parameters vs. Junction Temperature

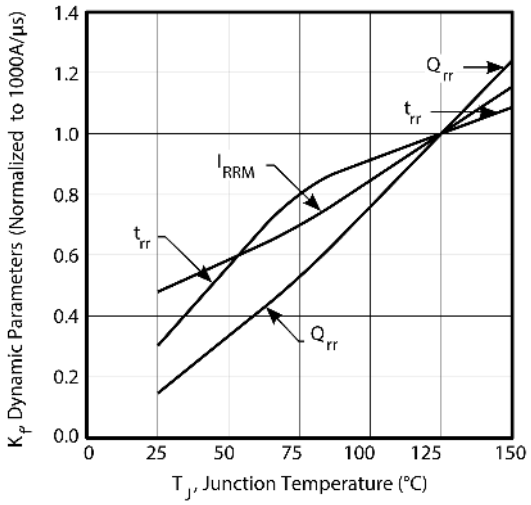


Figure 7 • Maximum Average Forward Current vs. Case Temperature

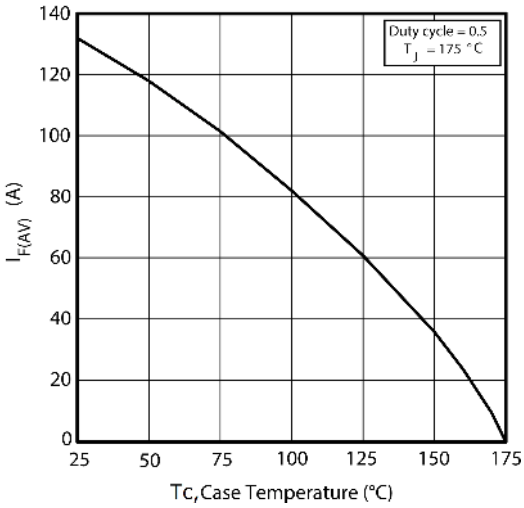
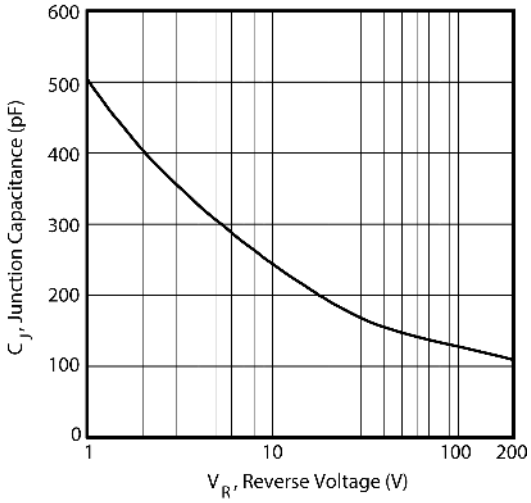


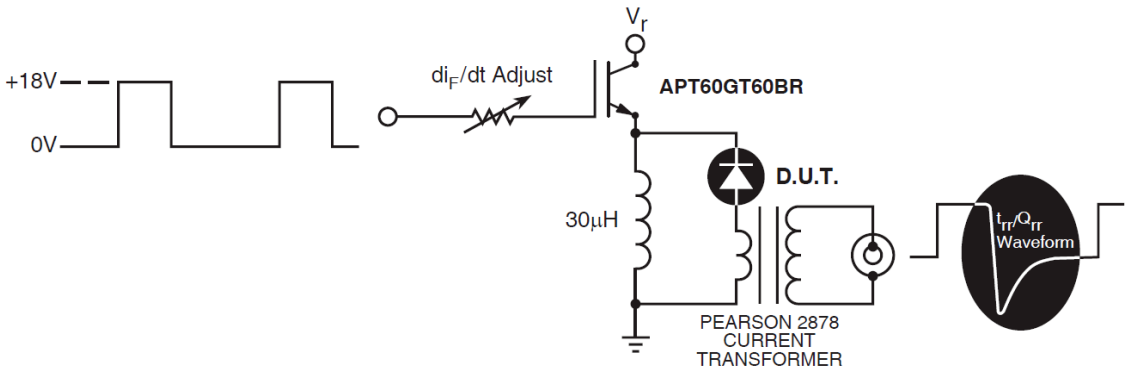
Figure 8 • Junction Capacitance vs. Reverse Voltage



2.5 Reverse Recovery Overview

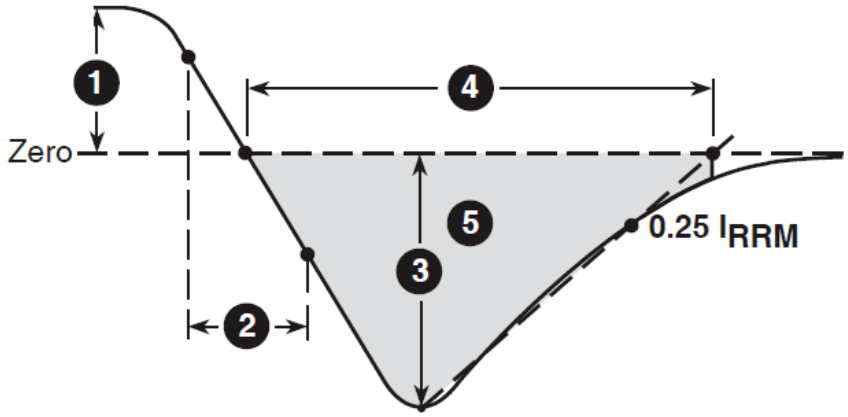
The following figure illustrates the diode test circuit for the APT75DQ60SG device.

Figure 9 • Diode Test Circuit



The following figure illustrates the diode reverse recovery waveform and definitions for the APT75DQ60SG device.

Figure 10 • Diode Reverse Recovery Waveform and Definitions



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}.

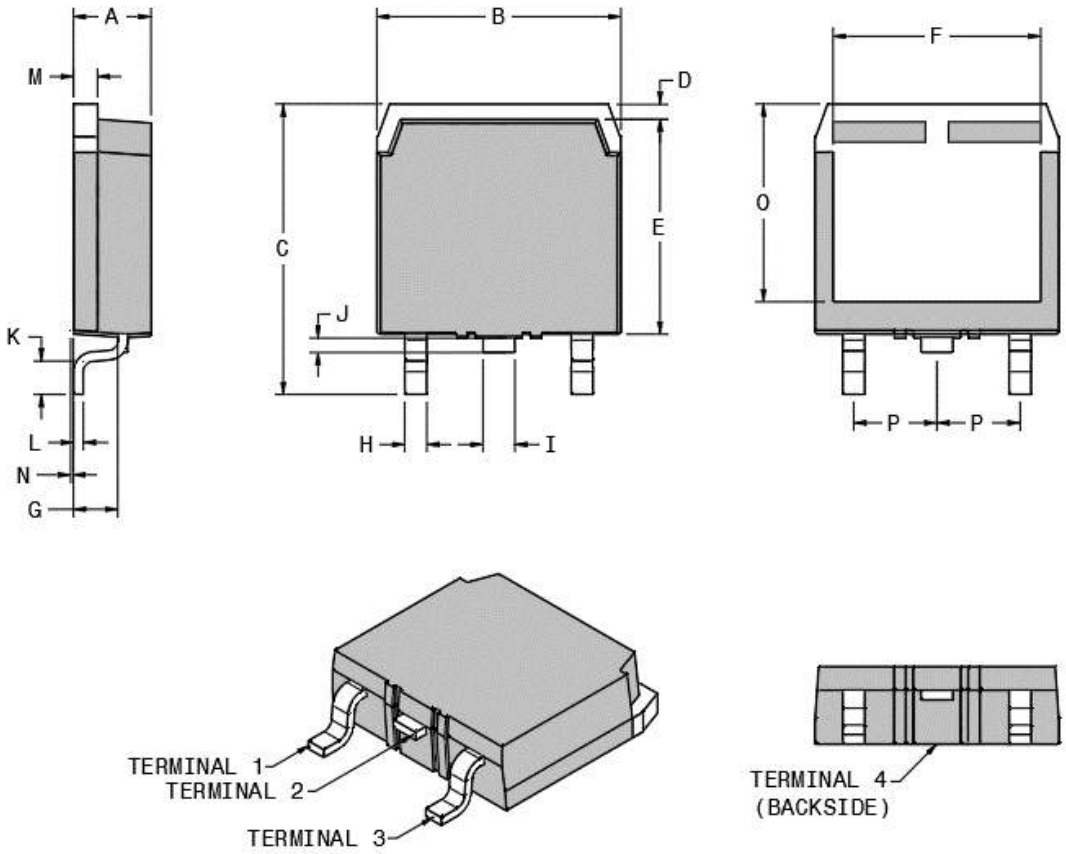
3 Package Specification

This section shows the package specification for the APT75DQ60SG device.

3.1 Package Outline Drawing

The following figure illustrates the TO-268 package outline of the APT75DQ60SG device.

Figure 11 • Package Outline Drawing



The following table lists the TO-268 dimensions and should be used in conjunction with the package outline drawing.

Table 5 • TO-268 Dimensions

Symbol	Min (mm)	Max (mm)	Min (in.)	Max (in.)
A	4.90	5.10	0.193	0.201
B	15.85	16.20	0.624	0.638
C	18.70	19.10	0.736	0.752
D	1.00	1.25	0.039	0.049
E	13.80	14.00	0.543	0.551
F	13.30	13.60	0.524	0.535
G	2.70	2.90	0.106	0.114
H	1.15	1.45	0.045	0.057
I	1.95	2.21	0.077	0.087
J	0.94	1.40	0.037	0.055
K	2.40	2.70	0.094	0.106
L	0.40	0.60	0.016	0.024
M	1.45	1.60	0.057	0.063
N	0.00	0.18	0.000	0.007
O	12.40	12.70	0.488	0.500
P	5.45 BSC (nom.)		0.215 BSC (nom.)	
Terminal 1	Cathode			
Terminal 2	Cathode			
Terminal 3	Anode			
Terminal 4	Cathode			

Microsemi Headquarters
One Enterprise, Aliso Viejo,
CA 92656 USA
Within the USA: +1 (800) 713-4113
Outside the USA: +1 (949) 380-6100
Sales: +1 (949) 380-6136
Fax: +1 (949) 215-4996
Email: sales.support@microsemi.com
www.microsemi.com

Microsemi, a wholly owned subsidiary of Microchip Technology Inc. (Nasdaq: MCHP), offers a comprehensive portfolio of semiconductor and system solutions for aerospace & defense, communications, data center and industrial markets. Products include high-performance and radiation-hardened analog mixed-signal integrated circuits, FPGAs, SoCs and ASICs; power management products; timing and synchronization devices and precise time solutions, setting the world's standard for time; voice processing devices; RF solutions; discrete components; enterprise storage and communication solutions; security technologies and scalable anti-tamper products; Ethernet solutions; Power-over-Ethernet ICs and midspans; as well as custom design capabilities and services. Microsemi is headquartered in Aliso Viejo, California, and has approximately 4,800 employees globally. Learn more at www.microsemi.com.

053-4256 | March 2019 | Final