



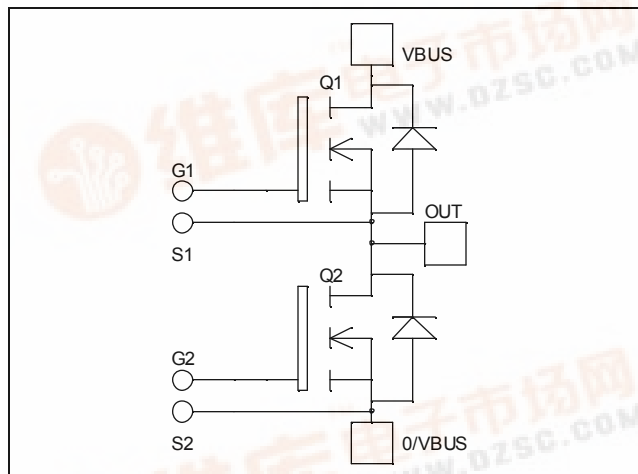
APT120A15F

Phase leg MOSFET Power Module

$$V_{DS} = 1200V$$

$$R_{DS(on)} = 150m\Omega \text{ max @ } T_j = 25^\circ C$$

$$I_D = 60A \text{ @ } T_c = 25^\circ C$$



Application

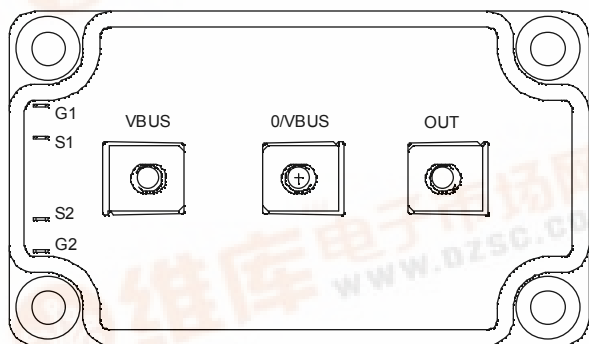
- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- Motor control

Features

- Power MOS 7[®] FREDFETs
 - Low $R_{DS(on)}$
 - Low input and Miller capacitance
 - Low gate charge
 - Fast intrinsic reverse diode
 - Avalanche energy rated
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration

Benefits

- Outstanding performance at high frequency operation
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- Low profile



Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DS}	Drain - Source Breakdown Voltage	1200	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	60
		$T_c = 80^\circ C$	45
I_{DM}	Pulsed Drain current	240	A
V_{GS}	Gate - Source Voltage	± 30	V
$R_{DS(on)}$	Drain - Source ON Resistance	150	m Ω
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1250
I_{AR}	Avalanche current (repetitive and non repetitive)	22	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

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

All ratings @ $T_j = 25^\circ\text{C}$ unless otherwise specified

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
BV_{DSS}	Drain - Source Breakdown Voltage	$V_{GS} = 0V, I_D = 1mA$	1200			V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0V, V_{DS} = 1200V, T_j = 25^\circ\text{C}$			400	μA
		$V_{GS} = 0V, V_{DS} = 1000V, T_j = 125^\circ\text{C}$			2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10V, I_D = 30A$			150	$m\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10mA$	3		5	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30V, V_{DS} = 0V$			± 250	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0V$		20.6		nF
C_{oss}	Output Capacitance	$V_{DS} = 25V$		3.08		
C_{rss}	Reverse Transfer Capacitance	$f = 1MHz$		0.52		
Q_g	Total gate Charge	$V_{GS} = 10V$		748		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 600V$		96		
Q_{gd}	Gate – Drain Charge	$I_D = 60A$		480		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching @ 125°C $V_{GS} = 15V$ $V_{Bus} = 800V$ $I_D = 60A$ $R_G = 1.2\Omega$		20		ns
T_r	Rise Time			15		
$T_{d(off)}$	Turn-off Delay Time			160		
T_f	Fall Time			45		
E_{on}	Turn-on Switching Energy ❶	Inductive switching @ 25°C $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 60A, R_G = 1.2\Omega$		3.96		mJ
E_{off}	Turn-off Switching Energy ❷			2.74		
E_{on}	Turn-on Switching Energy ❶	Inductive switching @ 125°C $V_{GS} = 15V, V_{Bus} = 800V$ $I_D = 60A, R_G = 1.2\Omega$		6.26		mJ
E_{off}	Turn-off Switching Energy ❷			3.43		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			60	A
		$T_c = 80^\circ\text{C}$			45	
V_{SD}	Diode Forward Voltage	$V_{GS} = 0V, I_S = -60A$			1.3	V
dv/dt	Peak Diode Recovery ❸				18	V/ns
t_{rr}	Reverse Recovery Time	$I_S = -60A$ $V_R = 600V$ $di_S/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$		320	ns
			$T_j = 125^\circ\text{C}$		650	
Q_{rr}	Reverse Recovery Charge	$I_S = -60A$ $V_R = 600V$ $di_S/dt = 400A/\mu s$	$T_j = 25^\circ\text{C}$	8		μC
			$T_j = 125^\circ\text{C}$	28		

❶ E_{on} includes diode reverse recovery.

❷ In accordance with JEDEC standard JESD24-1.

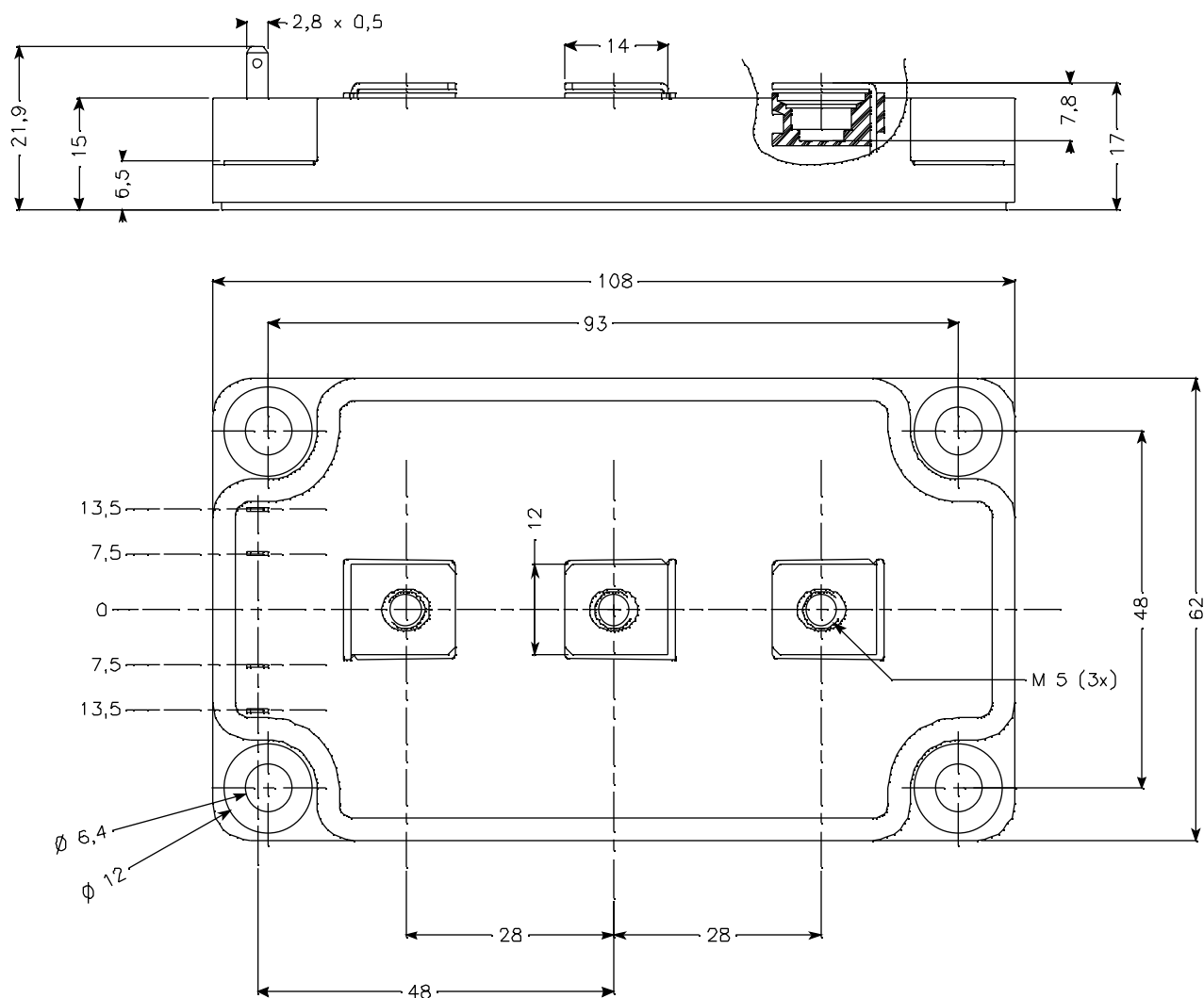
❸ dv/dt numbers reflect the limitations of the circuit rather than the device itself.

$I_S \leq -60A$ $di/dt \leq 700A/\mu s$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

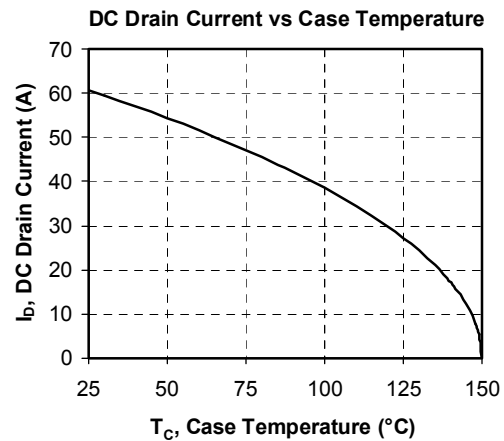
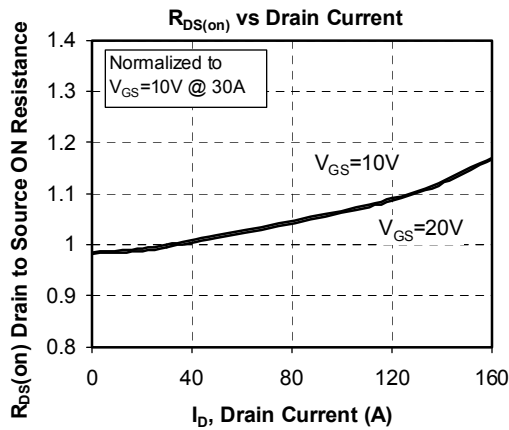
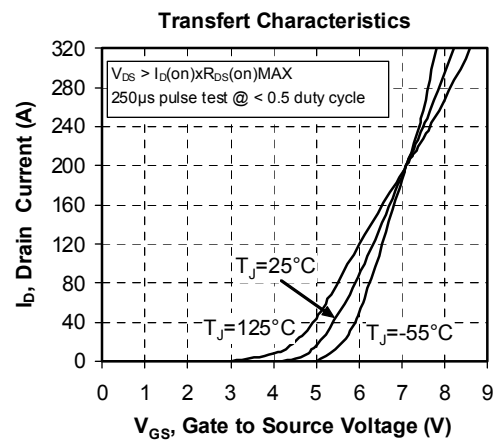
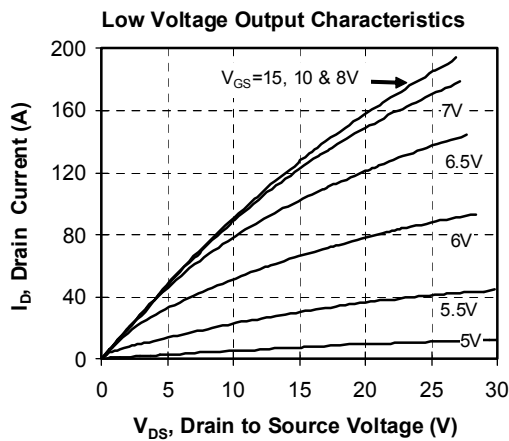
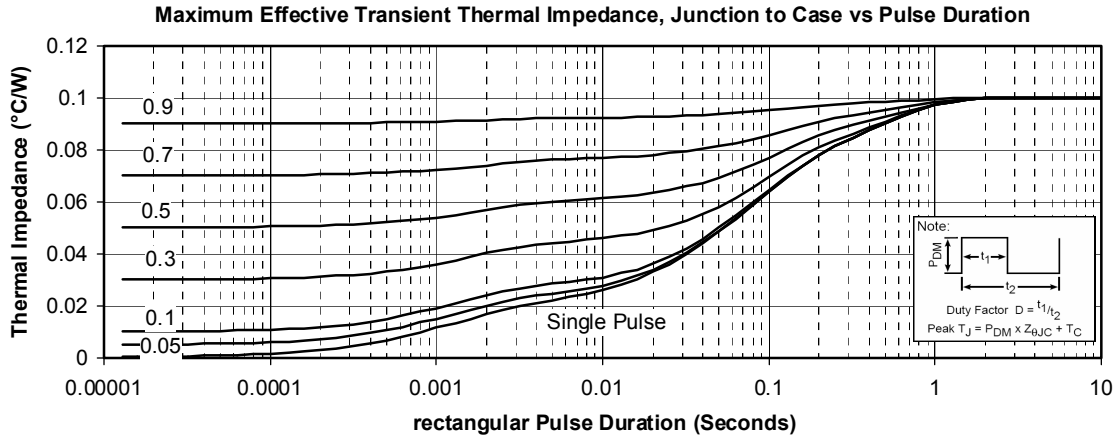
Thermal and package characteristics

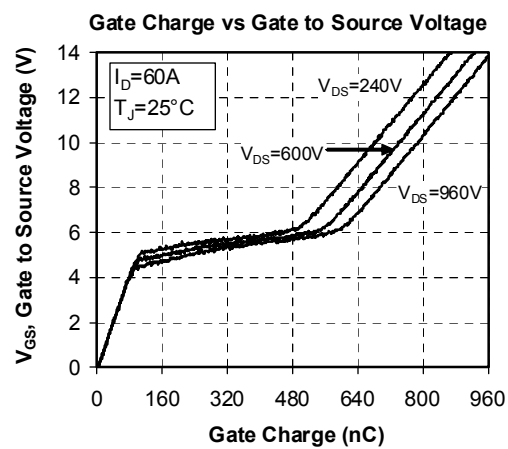
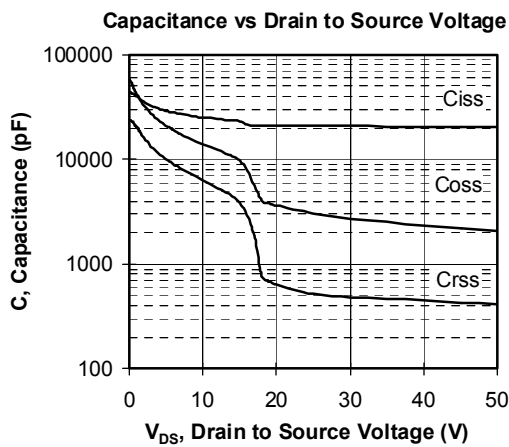
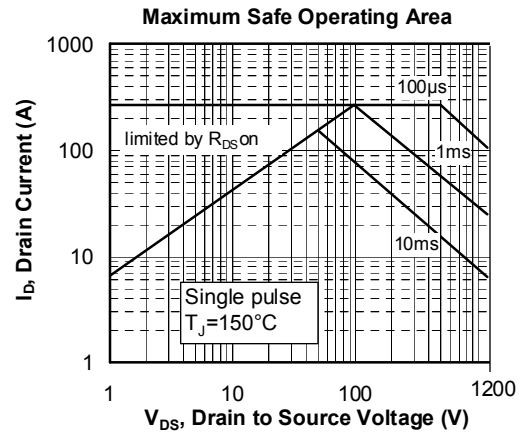
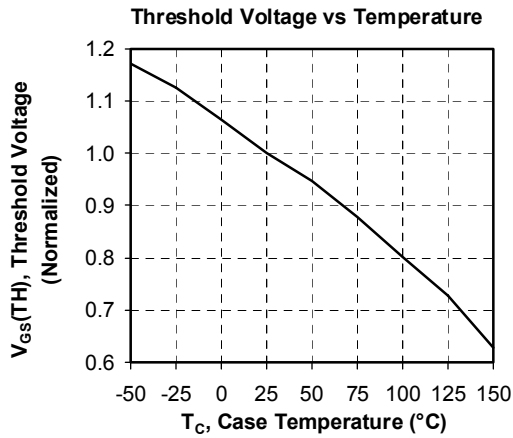
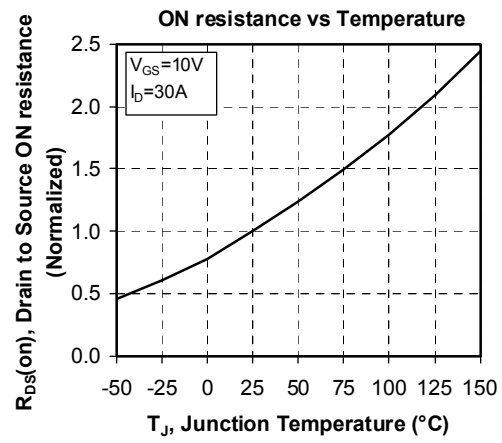
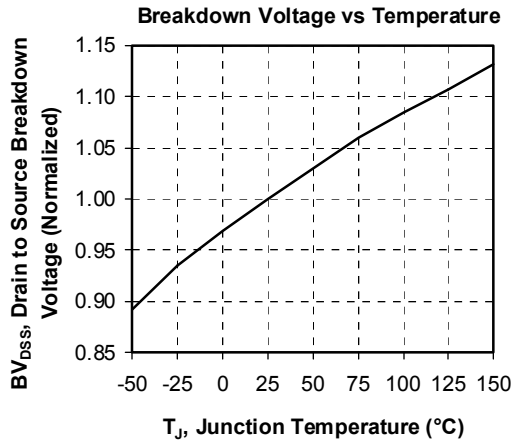
Symbol	Characteristic	Min	Typ	Max	Unit
R _{thJC}	Junction to Case			0.1	°C/W
V _{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, I isol<1mA, 50/60Hz	2500			V
T _J	Operating junction temperature range	-40		150	°C
T _{STG}	Storage Temperature Range	-40		125	
T _C	Operating Case Temperature	-40		100	
Torque	Mounting torque	To heatsink	M6	3	N.m
		For terminals	M5	2	
Wt	Package Weight			280	g

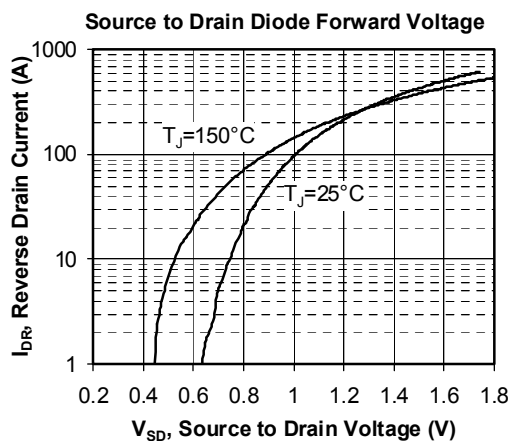
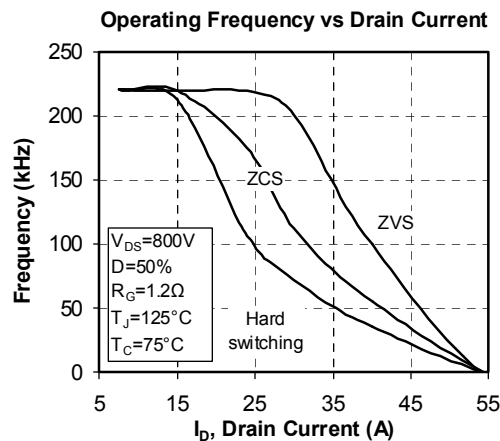
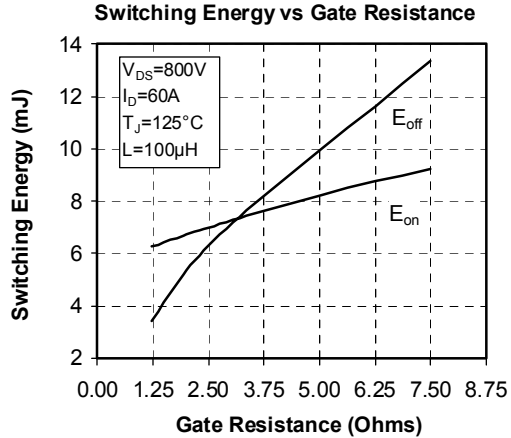
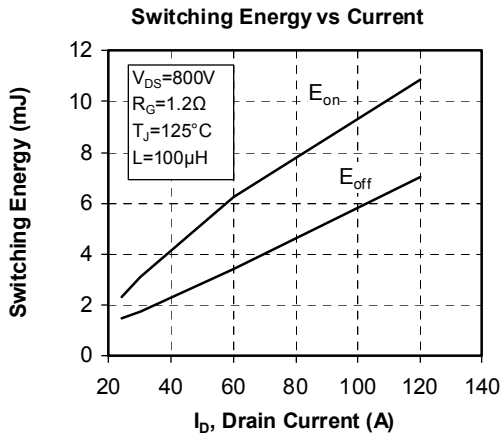
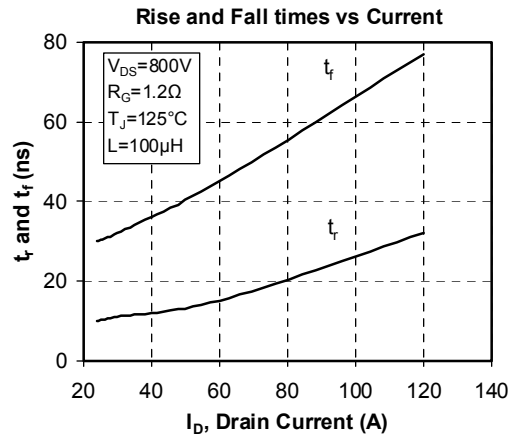
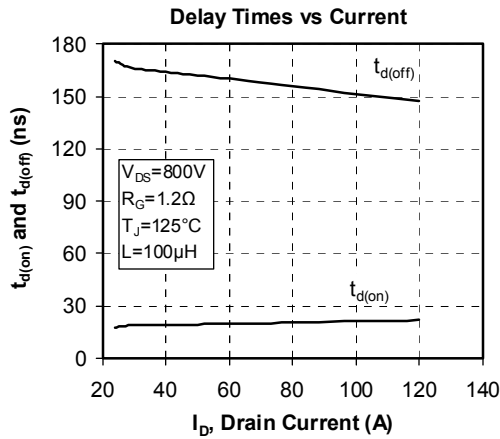
Package outline



Typical Performance Curve







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APT's products are covered by one or more of U.S. patents 4,895,810 5,045,903 5,089,434 5,182,234 5,019,522 5,262,336 6,503,786 5,256,583 4,748,103 5,283,202 5,231,474 5,434,095 5,528,058 and foreign patents. U.S. and Foreign patents pending. All Rights Reserved.