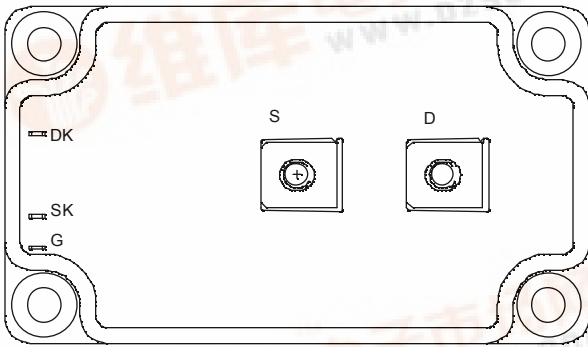
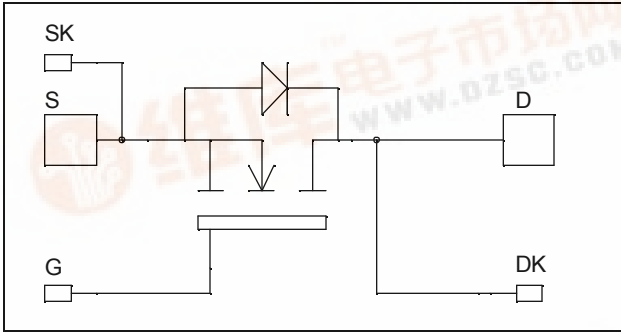




APT0502FAG

Single Switch MOSFET Power Module

$V_{DSS} = 100V$
 $R_{DSon} = 2.25m\Omega \text{ typ @ } T_j = 25^\circ C$
 $I_D = 570A^* \text{ @ } T_c = 25^\circ C$



Application

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

Features

- Power MOS V[®] FREDFETs
 - Low R_{DSon}
 - Low input and Miller capacitance
 - Low gate charge
 - Avalanche energy rated
 - Fast intrinsic diode
 - Very rugged
- Kelvin source for easy drive
- Very low stray inductance
 - Symmetrical design
 - M5 power connectors
- High level of integration
- AlN substrate for improved thermal performance

Benefits

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

Absolute maximum ratings

Symbol	Parameter	Max ratings	Unit
V_{DSS}	Drain - Source Breakdown Voltage	100	V
I_D	Continuous Drain Current	$T_c = 25^\circ C$	570 *
		$T_c = 80^\circ C$	429
I_{DM}	Pulsed Drain current	1900	A
V_{GS}	Gate - Source Voltage	± 30	V
R_{DSon}	Drain - Source ON Resistance	2.5	$m\Omega$
P_D	Maximum Power Dissipation	$T_c = 25^\circ C$	1660
I_{AR}	Avalanche current (repetitive and non repetitive)	100	A
E_{AR}	Repetitive Avalanche Energy	50	mJ
E_{AS}	Single Pulse Avalanche Energy	3000	

* Specification of MOSFET device but output current must be limited to 500A to not exceed a delta of temperature greater than 100°C for the connectors.



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

Electrical Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{V}, V_{DS} = 100\text{V}$			400	μA
		$V_{GS} = 0\text{V}, V_{DS} = 80\text{V}$	$T_j = 25^\circ\text{C}$		2000	
$R_{DS(on)}$	Drain – Source on Resistance	$V_{GS} = 10\text{V}, I_D = 200\text{A}$		2.25	2.5	$\text{m}\Omega$
$V_{GS(th)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 10\text{mA}$	2		4	V
I_{GSS}	Gate – Source Leakage Current	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$			± 400	nA

Dynamic Characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS} = 0\text{V}$		40		nF
C_{oss}	Output Capacitance	$V_{DS} = 25\text{V}$		15.7		
C_{rss}	Reverse Transfer Capacitance	$f = 1\text{MHz}$		5.9		
Q_g	Total gate Charge	$V_{GS} = 10\text{V}$		1360		nC
Q_{gs}	Gate – Source Charge	$V_{Bus} = 50\text{V}$		240		
Q_{gd}	Gate – Drain Charge	$I_D = 400\text{A}$		720		
$T_{d(on)}$	Turn-on Delay Time	Inductive switching		160		ns
T_r	Rise Time	$V_{GS} = 15\text{V}$		240		
$T_{d(off)}$	Turn-off Delay Time	$V_{Bus} = 66\text{V}$		500		
T_f	Fall Time	$I_D = 400\text{A}$		160		
E_{on}	Turn-on Switching Energy	Inductive switching @ 25°C		2.2		mJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 66\text{V}$ $I_D = 400\text{A}, R_G = 1.25\Omega$		2.41		
E_{on}	Turn-on Switching Energy	Inductive switching @ 125°C		2.43		mJ
E_{off}	Turn-off Switching Energy	$V_{GS} = 15\text{V}, V_{Bus} = 66\text{V}$ $I_D = 400\text{A}, R_G = 1.25\Omega$		2.56		

Source - Drain diode ratings and characteristics

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit	
I_S	Continuous Source current (Body diode)	$T_c = 25^\circ\text{C}$			570*	A	
		$T_c = 80^\circ\text{C}$			429		
V_{SD}	Diode Forward Voltage	$V_{GS} = 0\text{V}, I_S = -400\text{A}$			1.3	V	
dv/dt	Peak Diode Recovery ①				5	V/ns	
t_{rr}	Reverse Recovery Time	$I_S = -400\text{A}$ $V_R = 66\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$			190	ns
			$T_j = 125^\circ\text{C}$			370	
Q_{rr}	Reverse Recovery Charge	$I_S = -400\text{A}$ $V_R = 66\text{V}$ $di/dt = 400\text{A}/\mu\text{s}$	$T_j = 25^\circ\text{C}$		1.6	μC	
			$T_j = 125^\circ\text{C}$		6.8		

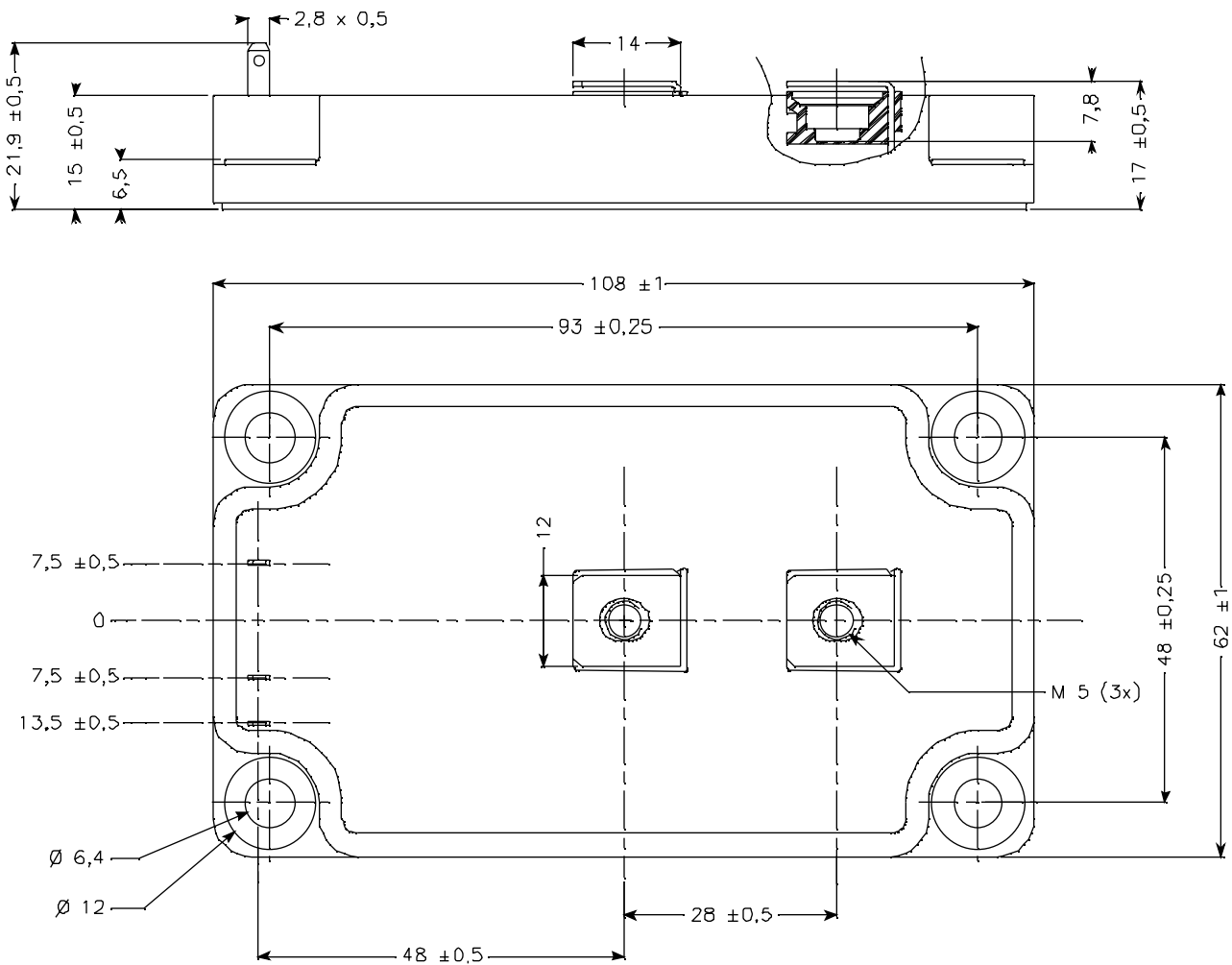
 ① dv/dt numbers reflect the limitations of the circuit rather than the device itself.

 $I_S \leq -570\text{A}$ $di/dt \leq 400\text{A}/\mu\text{s}$ $V_R \leq V_{DSS}$ $T_j \leq 150^\circ\text{C}$

Thermal and package characteristics

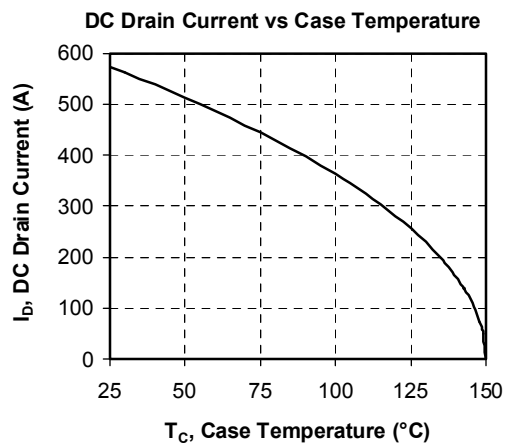
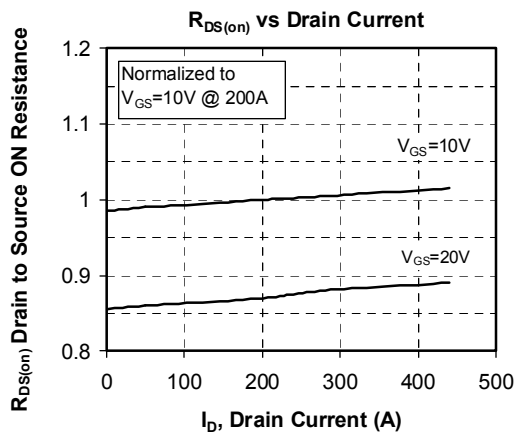
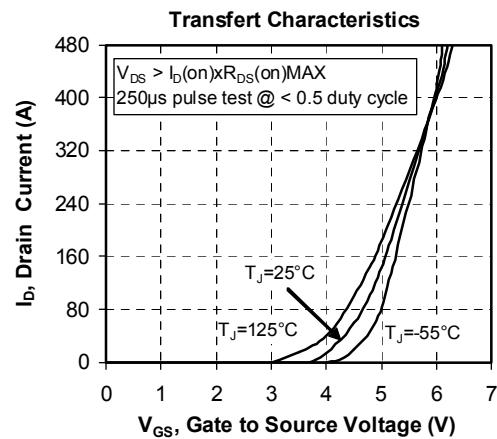
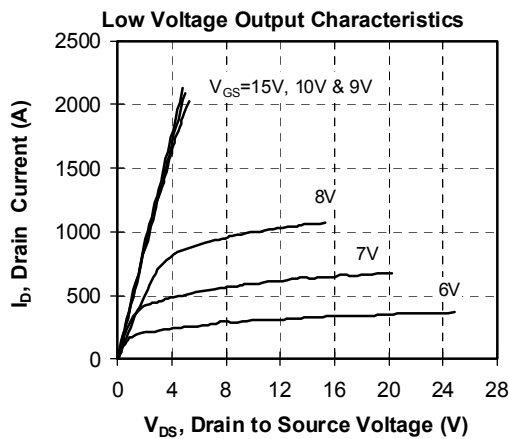
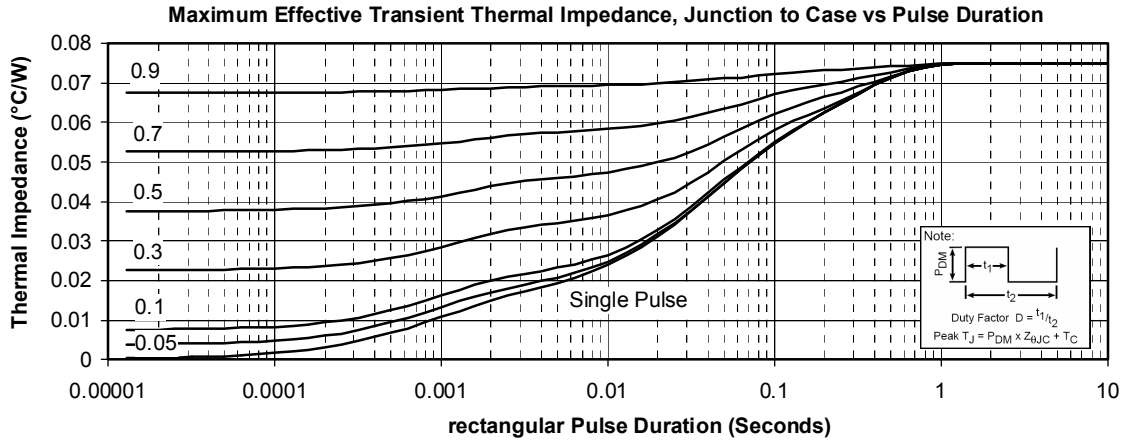
Symbol	Characteristic	Min	Typ	Max	Unit	
R_{thJC}	Junction to Case Thermal Resistance			0.075	°C/W	
V_{ISOL}	RMS Isolation Voltage, any terminal to case $t = 1$ min, $I_{isol} < 1$ mA, 50/60Hz	2500			V	
T_J	Operating junction temperature range	-40		150	°C	
T_{STG}	Storage Temperature Range	-40		125		
T_C	Operating Case Temperature	-40		100		
Torque	Mounting torque	To heatsink	M6	3	5	N.m
		For terminals	M5	2	3.5	
Wt	Package Weight			280	g	

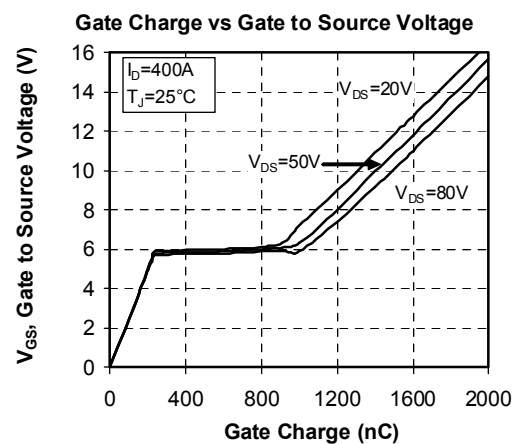
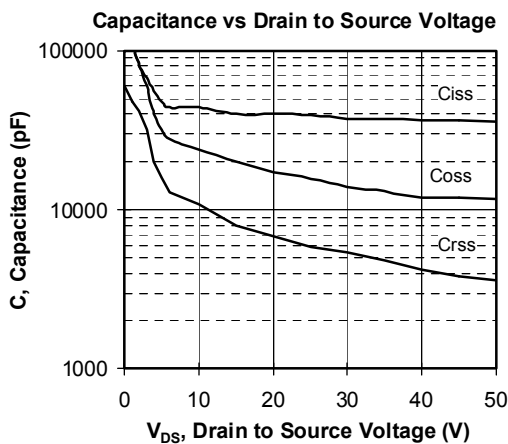
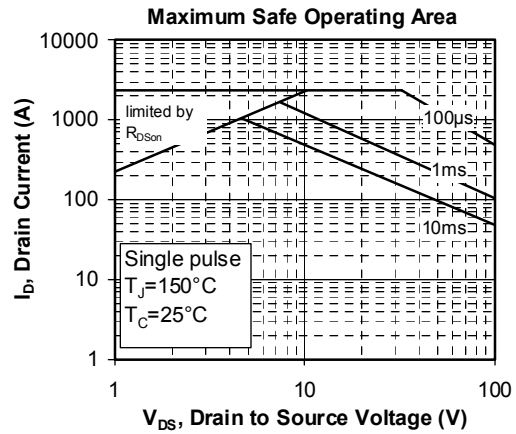
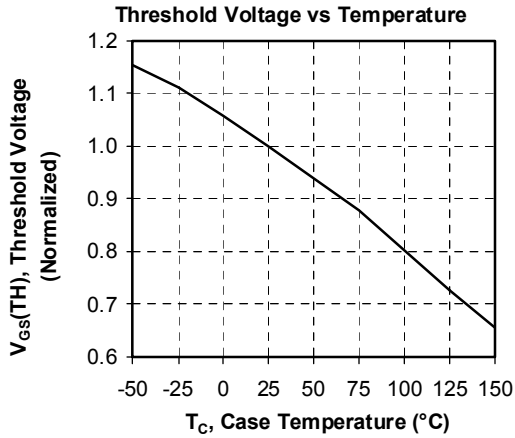
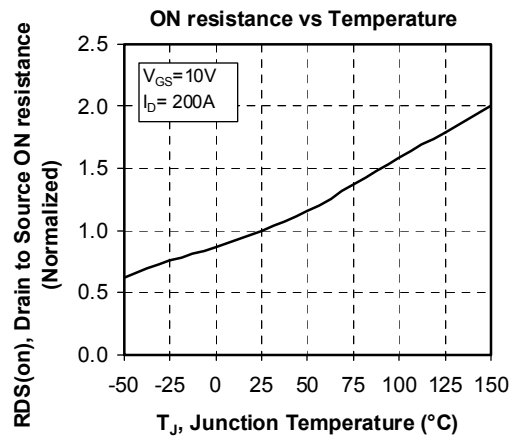
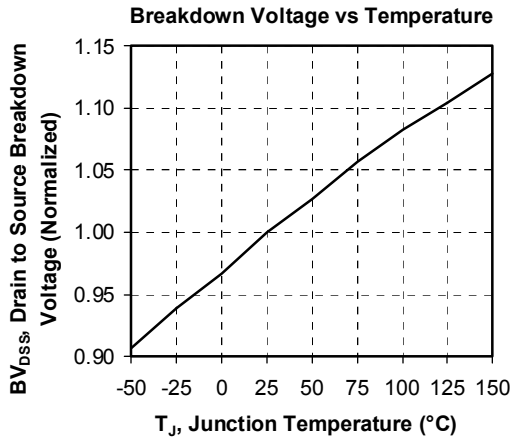
SP6 Package outline (dimensions in mm)

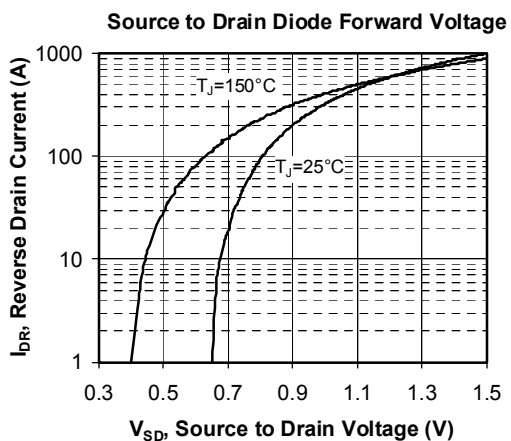
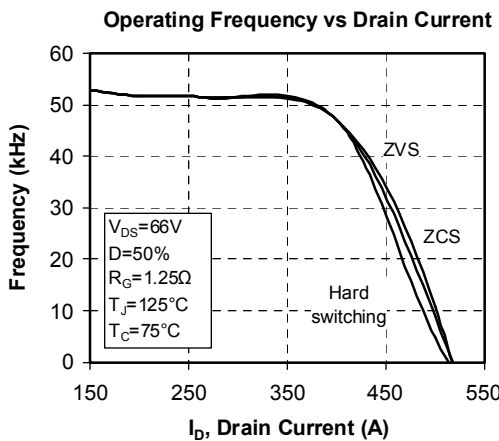
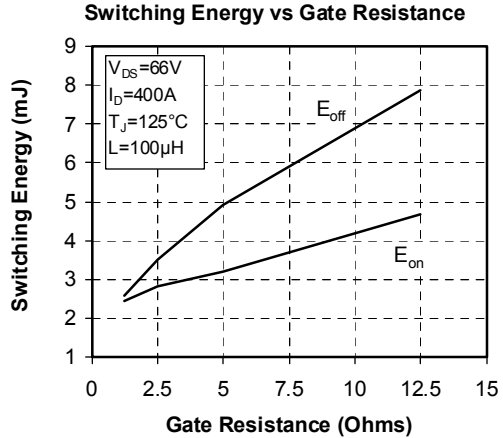
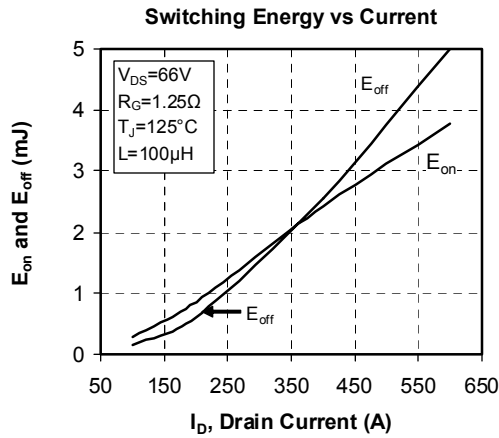
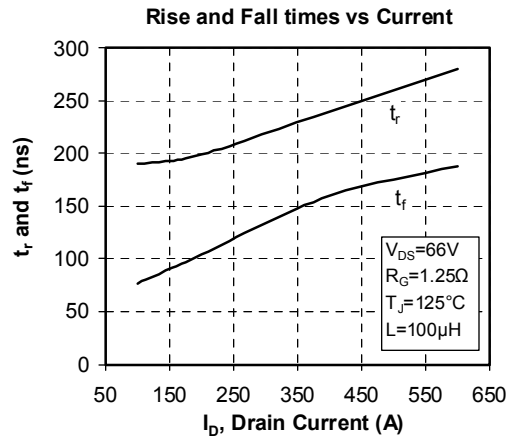
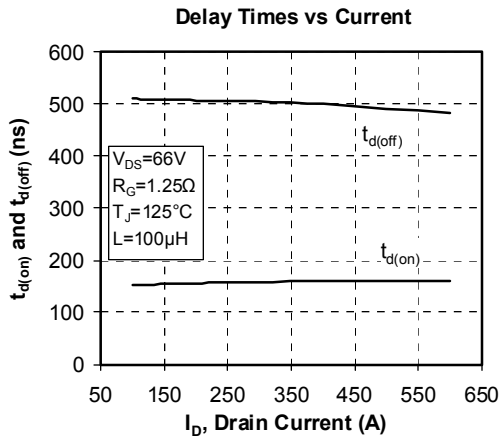


See application note APT0601 - Mounting Instructions for SP6 Power Modules on www.microsemi.com

Typical Performance Curve







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