

NVMFS5A140PLZ

Power MOSFET, Single P-Channel

–40 V, –140 A, 4.2 mΩ

Features

- Small Footprint (5 x 6 mm) for Compact Design
- Low $R_{DS(on)}$ to Minimize Conduction Losses
- NVMFS5A140PLZWF: Wettable Flank Option for Enhanced Optical Inspection
- AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

SPECIFICATION MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted) (Notes 1, 2, 3)

Symbol	Parameter			Value	Unit
V _{DSS}	Drain to Source Voltage			−40	V
V _{GS}	Gate to Source Voltage			±20	V
I _D	Continuous Drain, Current R _{θJC} , (Notes 1, 3)	Steady State	T _C = 25°C	−140	A
P _D	Power Dissipation R _{θJC} (Note 1)		T _C = 25°C	200	W
I _D	Continuous Drain: Current R _{θJA} (Notes 1, 2, 3)	Steady State	T _A = 25°C	−20	A
P _D	Power Dissipation R _{θJA} (Note 1, 2)		T _A = 25°C	3.8	W
I _{DP}	Pulsed Drain Current	PW ≤ 10 μs, duty cycle ≤ 1%		−560	A
T _J , T _{STG}	Operating Junction and Storage Temperature			−55 to +175	°C
I _S	Source Current (Body Diode)			−140	A
E _{AS}	Single Pulse Drain to Source Avalanche Energy (L= 1.0 mH, I _{L(pk)} = −29 A)			420	mJ
T _L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

THERMAL CHARACTERISTICS

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Junction to Case Steady State	0.75	$^\circ\text{C/W}$
$R_{\theta JA}$	Junction to Ambient Steady State (Note 2)	39	

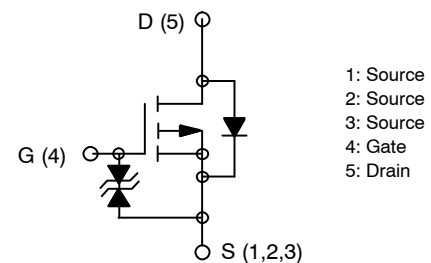
1. The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
2. Surface mounted on FR4 board using a 650 mm², 2 oz. Cu pad.
3. Maximum current for pulses as long as 1 second is higher but is dependent on pulse duration and duty cycle.



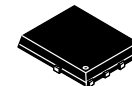
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V_{DS}	$R_{DS(on)}$ MAX	I_D MAX
–40 V	4.2 mΩ @ –10 V	–140 A
	7.2 mΩ @ –4.5 V	

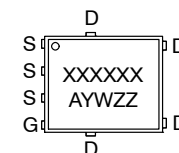


P-CHANNEL MOSFET



DFN5
(SO-8FL)

MARKING DIAGRAM



XXXXXX = Specific Device Code
5A140L(NVMFS5A140PLZ)
140LWF(NVMFS5A140PLZWF)
A = Assembly Location
Y = Year
W = Work Week
ZZ = Lot Traceability

ORDERING INFORMATION

See detailed ordering and shipping information on page 7 of this data sheet.

NVMFS5A140PLZ

ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise noted)

Symbol	Parameter	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

V _{(BR)DSS}	Drain to Source Breakdown Voltage	I _D = -1 mA, V _{GS} = 0 V	-40			V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = -40 V, V _{GS} = 0 V				
		T _J = 25°C			-1.0	μA
		T _J = 100°C (Note 4)			-100	μA
I _{GSS}	Gate to Source Leakage Current	V _{GS} = ±16 V, V _{DS} = 0 V			±10	μA

ON CHARACTERISTICS (Note 5)

V _{GS(th)}	Gate Threshold Voltage	V _{DS} = -10 V, I _D = -1 mA	-1.2		-2.6	V
R _{DS(on)}	Drain to Source On Resistance	V _{GS} = -10 V		3.2	4.2	mΩ
		V _{GS} = -4.5 V		5.0	7.2	
g _{FS}	Forward Transconductance	V _{DS} = -10 V, I _D = -50 A		125		S

CHARGES, CAPACITANCES & GATE RESISTANCE

C _{iss}	Input Capacitance	V _{GS} = 0 V, f = 1 MHz			7400	pF
C _{oss}	Output Capacitance	V _{DS} = -20 V,			1030	
C _{rss}	Reverse Transfer Capacitance				720	
Q _{g(tot)}	Total Gate Charge	V _{GS} = -10 V, I _D = -50 A			136	nC
Q _{gs}	Gate to Source Charge	V _{DS} = -20 V,			26	
Q _{gd}	Gate to Drain Charge				31	

SWITCHING CHARACTERISTICS (Note 6)

t _{d(on)}	Turn-On Delay Time	V _{DS} = -20 V, I _D = -50 A,			50	ns
t _r	Rise Time	V _{GS} = -10 V, R _G = 50 Ω			860	
t _{d(off)}	Turn-Off Delay Time				540	
t _f	Fall Time				740	

DRAIN-SOURCE DIODE CHARACTERISTICS

V _{SD}	Forward Diode Voltage	V _{GS} = 0 V, I _S = -50 A			-0.83	-1.5	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0 V, I _S = -50 A			108		ns
Q _{rr}	Reverse Recovery Charge	di/dt = 100 A/μs			236		nC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

4. The maximum value is specified by design at T_J = 100 °C. Product is not tested to this condition in production.

5. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2 %.

6. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

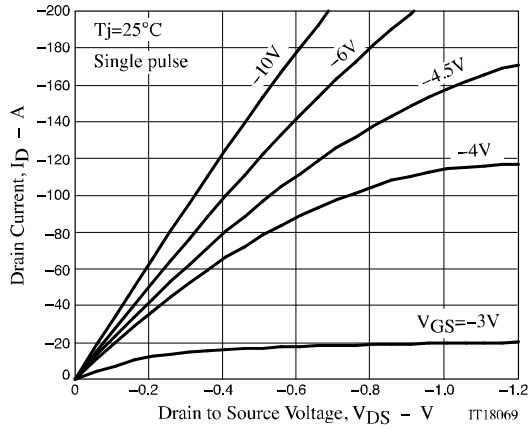


Figure 1. $I_D - V_{DS}$

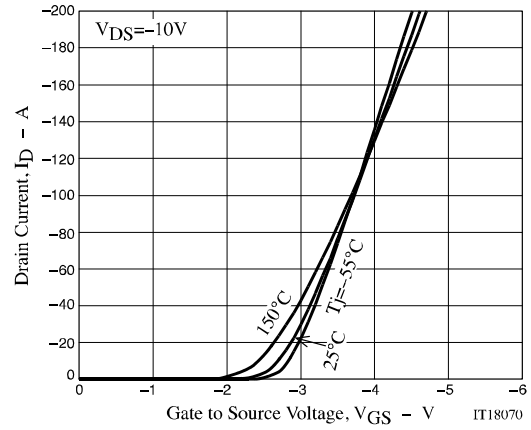


Figure 2. $I_D - V_{GS}$

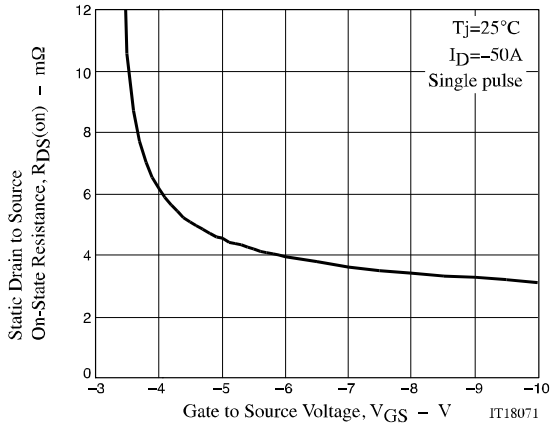


Figure 3. $R_{DS(on)} - V_{GS}$

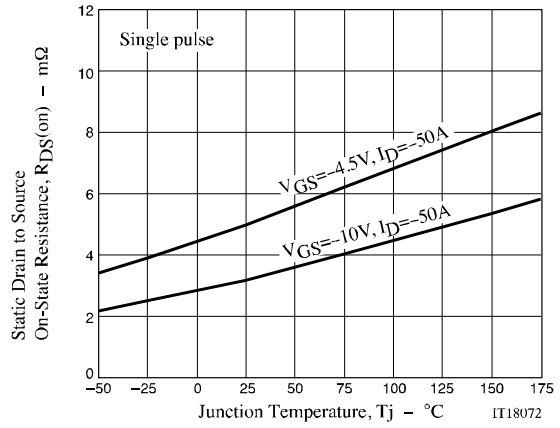


Figure 4. $R_{DS(on)} - T_j$

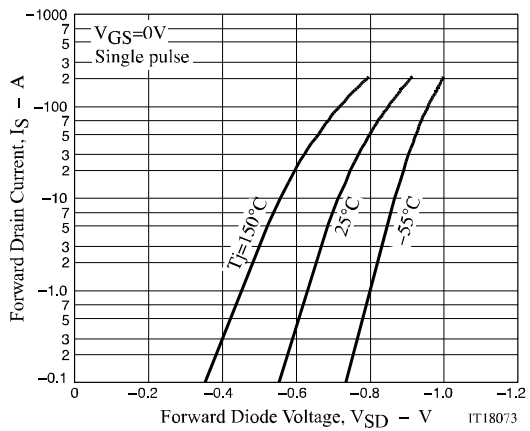


Figure 5. $I_S - V_{SD}$

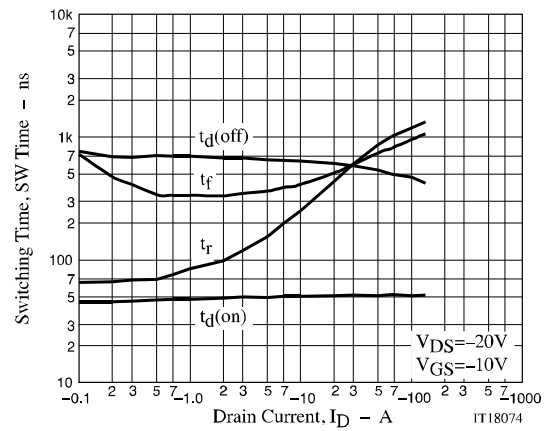


Figure 6. SW Time - I_D

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TYPICAL CHARACTERISTICS

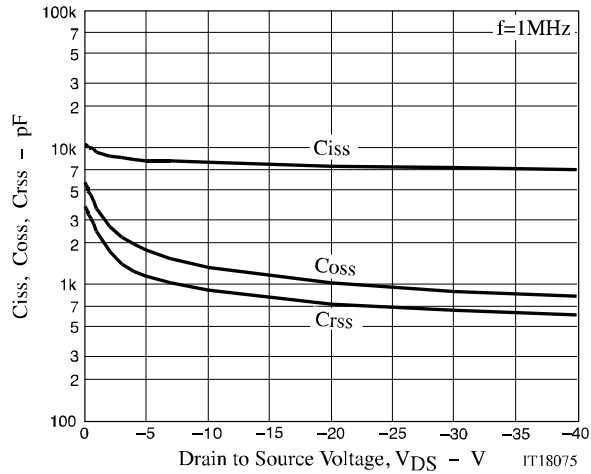


Figure 7. C_{iss} , C_{oss} , C_{rss} - V_{DS}

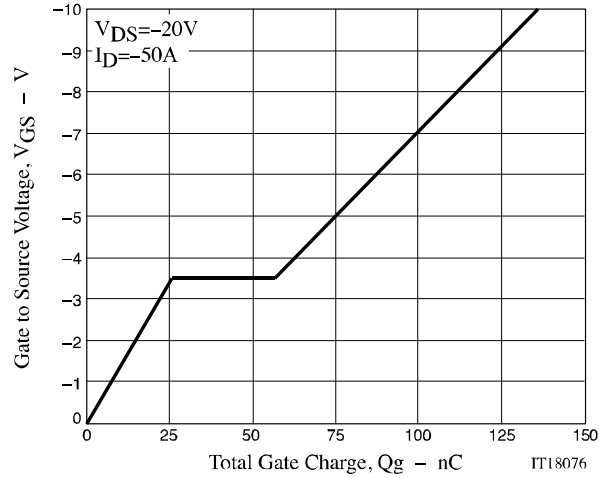


Figure 8. V_{GS} - Q_g

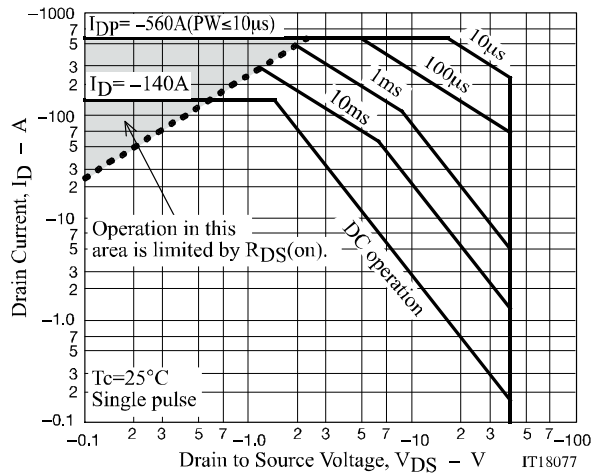


Figure 9. SOA

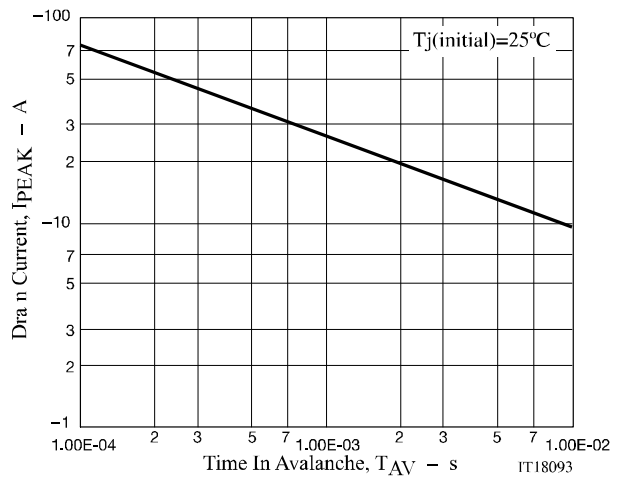


Figure 10. I_{PEAK} - T_{AV}

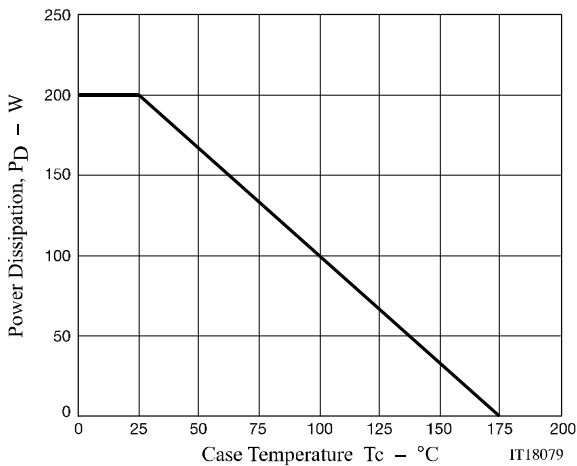


Figure 11. P_D - T_C

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TYPICAL CHARACTERISTICS

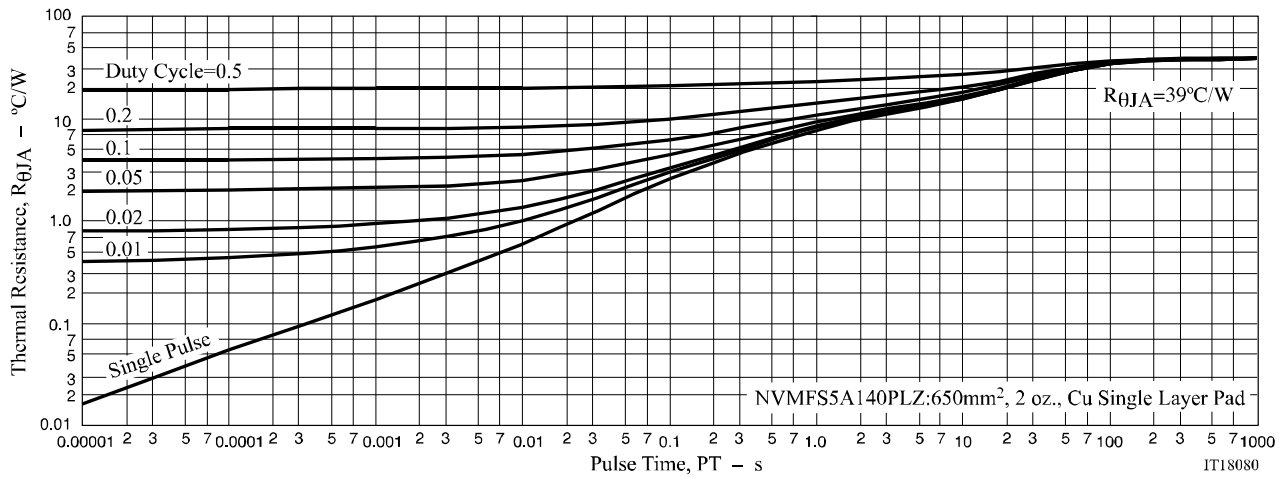
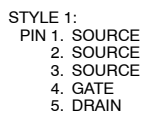
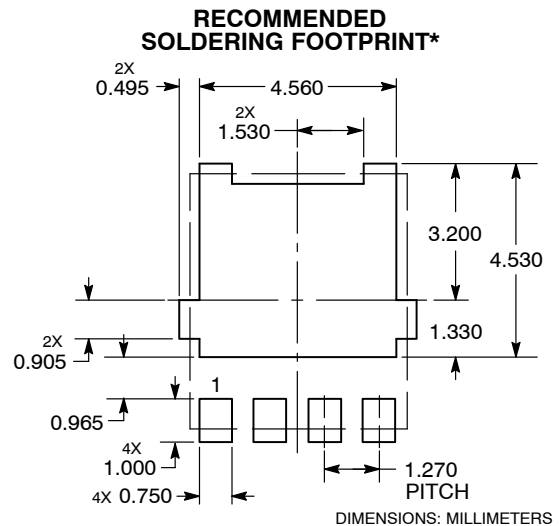


Figure 12. $R_{\theta JA}$ - Pulse Time

DFN5 5x6, 1.27P
(SO-8FL)
CASE 488AA
ISSUE M



- | | MILLIMETERS | | |
|-----|-------------|-------|------|
| DIM | MIN | NOM | MAX |
| A | 0.90 | 1.00 | 1.10 |
| A1 | 0.00 | ---- | 0.05 |
| b | 0.33 | 0.41 | 0.51 |
| c | 0.23 | 0.28 | 0.33 |
| D | 5.00 | 5.15 | 5.30 |
| D1 | 4.70 | 4.90 | 5.10 |
| D2 | 3.80 | 4.00 | 4.20 |
| E | 6.00 | 6.15 | 6.30 |
| E1 | 5.70 | 5.90 | 6.10 |
| E2 | 3.45 | 3.65 | 3.85 |
| e | 1.27 BSC | | |
| G | 0.51 | 0.575 | 0.71 |
| K | 1.20 | 1.35 | 1.50 |
| L | 0.51 | 0.575 | 0.71 |
| L1 | 0.125 REF | | |
| M | 3.00 | 3.40 | 3.80 |
| θ | 0 ° | ---- | 12 ° |



NVMFS5A140PLZ

ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing) [†]
NVMFS5A140PLZT1G	5A140L	DFN5 5x6, 1.27P (SO-8FL) (Pb-Free)	1.500 / Tape & Reel
NVMFS5A140PLZWFT1G	140LWF	DFN5 5x6, 1.27P (SO-8FL) (Pb-Free / Wettable Flanks)	1.500 / Tape & Reel
NVMFS5A140PLZT3G	5A140L	DFN5 5x6, 1.27P (SO-8FL) (Pb-Free)	5.000 / Tape & Reel
NVMFS5A140PLZWFT3G	140LWF	DFN5 5x6, 1.27P (SO-8FL) (Pb-Free / Wettable Flanks)	5.000 / Tape & Reel

[†]For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

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