Power MOSFET -60 V, 6.5 mΩ, -120 A, P-Channel

Automotive Power MOSFET designed for compact and efficient designs and including high thermal performance.

AEC-Q101 qualified MOSFET and PPAP capable suitable for automotive applications.

Features

- Low On-Resistance
- High Current Capability
- 100% Avalanche Tested
- AEC-Q101 qualified and PPAP capable
- ATPAK package is pin-compatible with DPAK (TO-252)
- Pb-Free, Halogen Free and RoHS compliance

Typical Applications

- Reverse Battery Protection
- Load Switch
- Automotive Front Lighting
- Automotive Body Controllers

SPECIFICATIONS

ABSOLUTE MAXIMUM RATING at Ta = 25°C (Note 1)

Parameter	Symbol	Value	Unit
Drain to Source Voltage	VDSS	-60	V
Gate to Source Voltage	VGSS	±20	V
Drain Current (DC)	ID	-120	А
Drain Current (Pulse) PW $\leq 10\mu s$, duty cycle $\leq 1\%$	IDP	-480	А
Power Dissipation Tc = 25°C	PD	108	W
Operating Junction and Storage Temperature	Tj, Tstg	-55 to +175	°C
Avalanche Energy (Single Pulse) (Note 2)	EAS	656	mJ
Avalanche Current (Note 3)	IAV	-75	А

Note 1 : 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.

2 : V_{DD} = -36 V, L = 100 μH, I_{AV} = -75 A (Fig.1)

3 : L ≤ 100 μ H, Single pulse

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Case Steady State (Tc = 25°C)	$R_{\theta}JC$	1.38	°C/W
Junction to Ambient (Note 4)	$R_{\theta}JA$	77.2	°C/W

Note 4 : Surface mounted on FR4 board using a 130 mm², 1 oz. Cu pad.

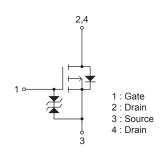


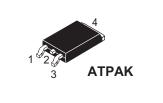
ON Semiconductor®

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VDSS	R _{DS} (on) Max	ID Max
–60 V	6.5 mΩ @ –10 V	400.4
	8.9 mΩ @ –4.5 V	–120 A

ELECTRICAL CONNECTION P-Channel







ORDERING INFORMATION

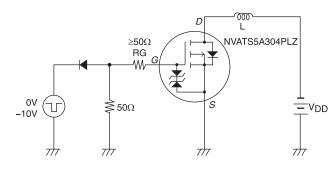
See detailed ordering and shipping information on page 6 of this data sheet.

ELECTRICAL CHARACTERISTICS at Ta = 25°C (Note 5)

Decemeter	Symbol	Symbol	Value			1.1
Parameter Symbol Conditions		Conditions	min	typ	max	Unit
Drain to Source Breakdown Voltage	V(BR)DSS	ID = -1 mA, V _{GS} = 0 V	-60			V
Zero-Gate Voltage Drain Current	IDSS	$V_{DS} = -60 \text{ V}, \text{ V}_{GS} = 0 \text{ V}$			-10	μA
Gate to Source Leakage Current	IGSS	V_{GS} = ±16 V, V_{DS} = 0 V			±10	μA
Gate Threshold Voltage	VGS(th)	$V_{DS} = -10 \text{ V}, \text{ I}_{D} = -1 \text{ mA}$	-1.2		-2.6	V
Forward Transconductance	9FS	V _{DS} = -10 V, I _D = -50 A		100		S
Static Drain to Source On-State	R _{DS} (on)1	I _D = -50 A, V _{GS} = -10 V		5.0	6.5	mΩ
Resistance	R _{DS} (on)2	I _D = -50 A, V _{GS} = -4.5 V		6.4	8.9	mΩ
Input Capacitance	Ciss			13,000		pF
Output Capacitance	Coss	V _{DS} = –20 V, f = 1 MHz		1,080		pF
Reverse Transfer Capacitance	Crss			760		pF
Turn-ON Delay Time	t _d (on)			80		ns
Rise Time	tr			650		ns
Turn-OFF Delay Time	t _d (off)	See Fig.2		780		ns
Fall Time	tf			460		ns
Total Gate Charge	Qg			250		nC
Gate to Source Charge	Qgs	V_{DS} = -36 V, V_{GS} = -10 V, I_D = -100 A		55		nC
Gate to Drain "Miller" Charge	Qgd			50		nC
Forward Diode Voltage	V _{SD}	Is = -100 A, V _{GS} = 0 V		-1.0	-1.5	V
Reverse Recovery Time	t _{rr}	See Fig.3		90		ns
Reverse Recovery Charge	Q _{rr}	I _S = –100 A, V _{GS} = 0 V, di/dt = –100 A/μs		245		nC

Note 5 : 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.

Fig.1 Unclamped Inductive Switching Test Circuit

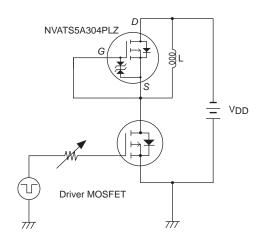


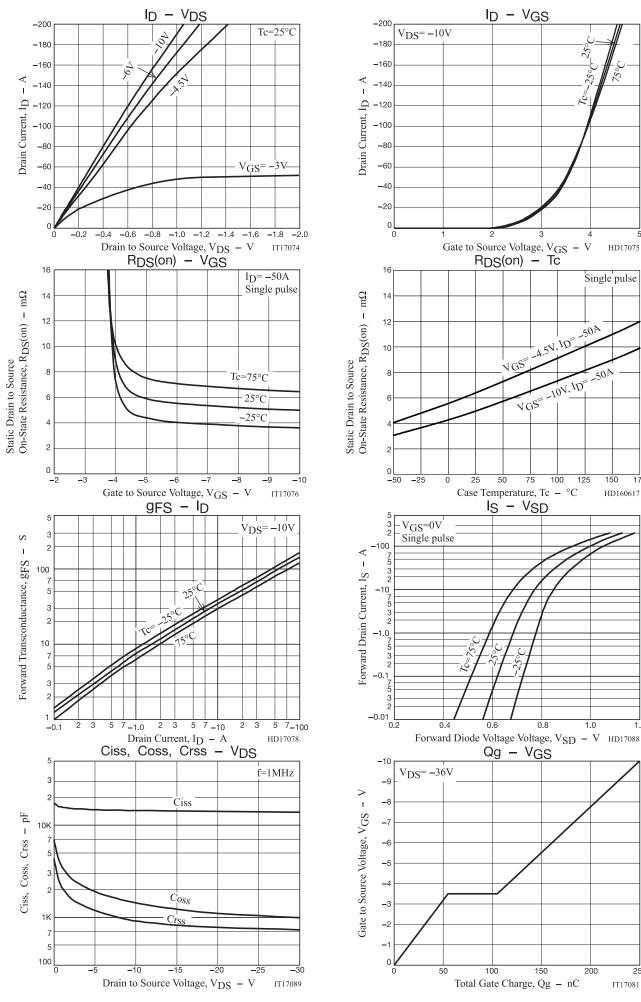
V_{DD}=-36V VIN 0V -10V Л I_D= -50A ≶ VIN RL=0.72Ω D -∘ Vout PW=10µs D.C.≤1% G NVATS5A304PLZ P.G ($\leq 50\Omega$

 \overline{m}

Fig.2 Switching Time Test Circuit

Fig.3 Reverse Recovery Time Test Circuit



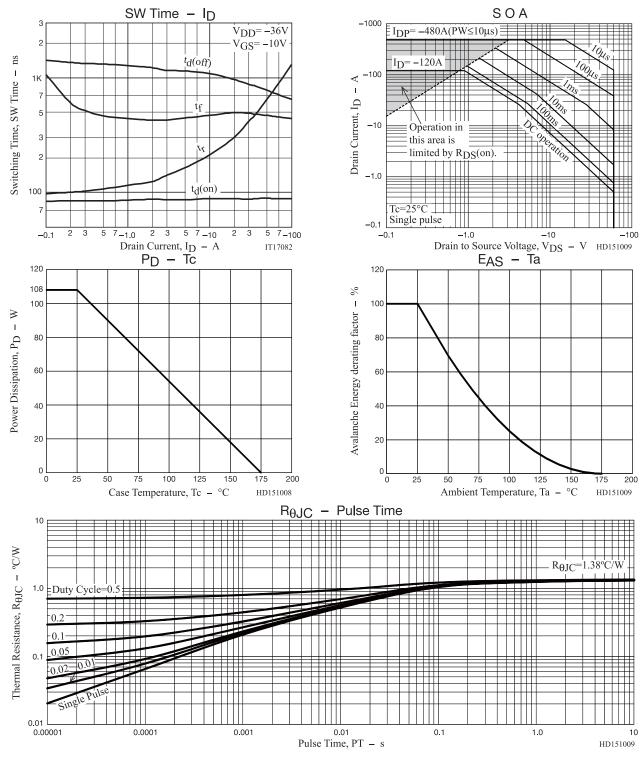


175

1.2

250

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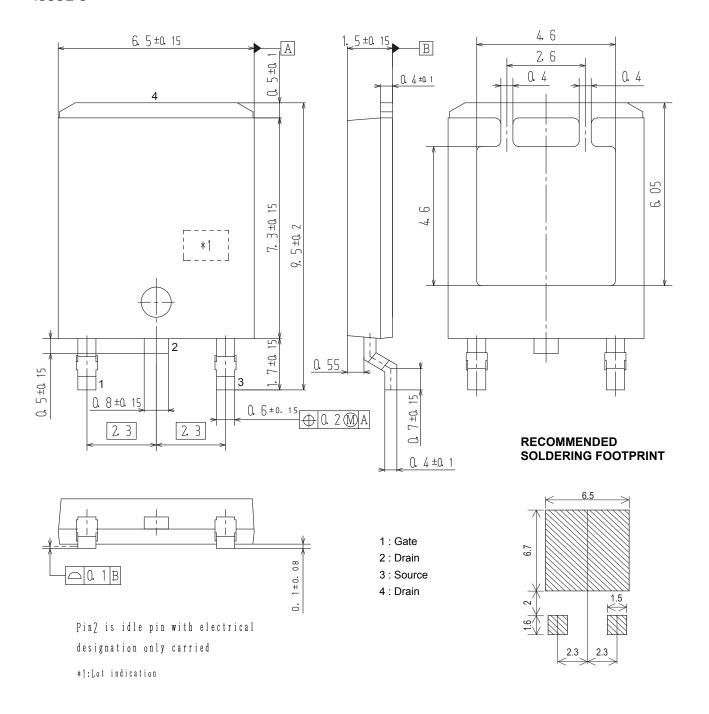


PACKAGE DIMENSIONS

unit : mm

DPAK (Single Gauge) / ATPAK

CASE 369AM ISSUE O



ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)		
NVATS5A304PLZT4G	ATP304	DPAK (Single Gauge) / ATPAK (Pb-Free / Halogen Free)	3,000 / 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. http://www.onsemi.com/pub_link/Collateral/BRD8011-D.PDF

Note on usage : Since the NVATS5A304PLZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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