

NVATS5A304PLZ

Power MOSFET

-60 V, 6.5 mΩ, -120 A, P-Channel



ON Semiconductor®

www.onsemi.com

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	V _{DSS}	-60	V
Gate to Source Voltage	V _{GSS}	±20	V
Drain Current (DC)	I _D	-120	A
Drain Current (Pulse) PW ≤ 10μs, duty cycle ≤ 1%	I _{DP}	-480	A
Power Dissipation Tc = 25°C	P _D	108	W
Operating Junction and Storage Temperature	T _J , T _{stg}	-55 to +175	°C
Avalanche Energy (Single Pulse) (Note 2)	E _{AS}	656	mJ
Avalanche Current (Note 3)	I _{AV}	-75	A

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 μH, Single pulse

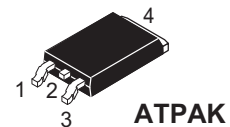
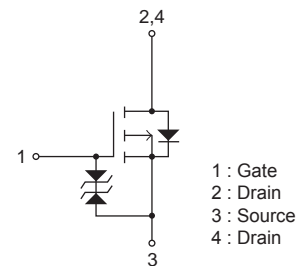
THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Case Steady State (Tc = 25°C)	R _{θJC}	1.38	°C/W
Junction to Ambient (Note 4)	R _{θJA}	77.2	°C/W

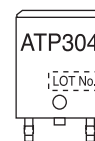
Note 4 : Surface mounted on FR4 board using a 130 mm², 1 oz. Cu pad.

V _{DSS}	R _{DS(on)} Max	I _D Max
-60 V	6.5 mΩ @ -10 V	-120 A
	8.9 mΩ @ -4.5 V	

ELECTRICAL CONNECTION P-Channel



MARKING



ORDERING INFORMATION

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

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

Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	V(BR)DSS	ID = -1 mA, VGS = 0 V	-60			V
Zero-Gate Voltage Drain Current	IDSS	VDS = -60 V, VGS = 0 V			-10	μA
Gate to Source Leakage Current	IGSS	VGS = ±16 V, VDS = 0 V			±10	μA
Gate Threshold Voltage	VGS(th)	VDS = -10 V, ID = -1 mA	-1.2		-2.6	V
Forward Transconductance	gFS	VDS = -10 V, ID = -50 A		100		S
Static Drain to Source On-State Resistance	RDS(on)1	ID = -50 A, VGS = -10 V		5.0	6.5	mΩ
	RDS(on)2	ID = -50 A, VGS = -4.5 V		6.4	8.9	mΩ
Input Capacitance	Ciss	VDS = -20 V, f = 1 MHz		13,000		pF
Output Capacitance	Coss			1,080		pF
Reverse Transfer Capacitance	Crss			760		pF
Turn-ON Delay Time	t _{d(on)}		See Fig.2		80	
Rise Time	t _r			650		ns
Turn-OFF Delay Time	t _{d(off)}			780		ns
Fall Time	t _f			460		ns
Total Gate Charge	Qg	VDS = -36 V, VGS = -10 V, ID = -100 A		250		nC
Gate to Source Charge	Qgs			55		nC
Gate to Drain "Miller" Charge	Qgd			50		nC
Forward Diode Voltage	VSD	IS = -100 A, VGS = 0 V		-1.0	-1.5	V
Reverse Recovery Time	t _{rr}	See Fig.3		90		ns
Reverse Recovery Charge	Q _{rr}	IS = -100 A, VGS = 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

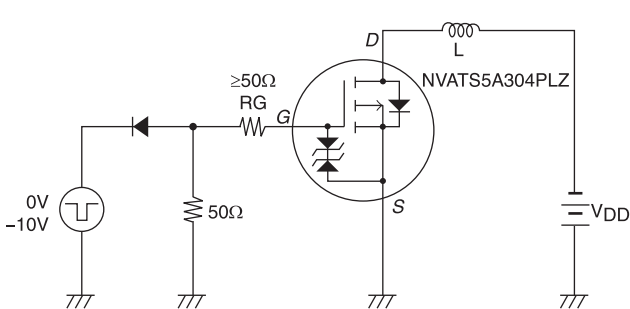


Fig.2 Switching Time Test Circuit

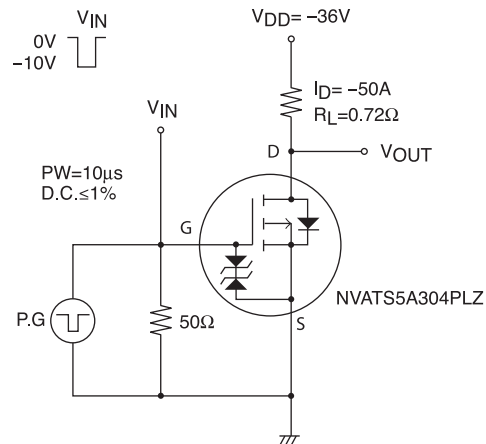
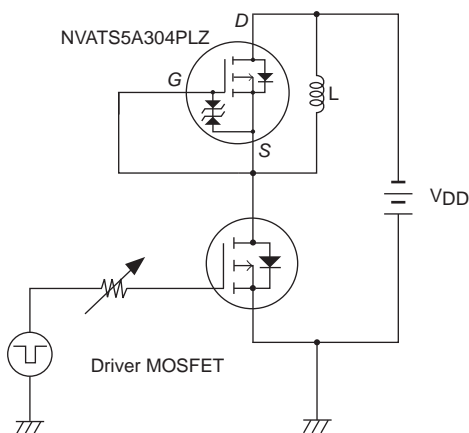
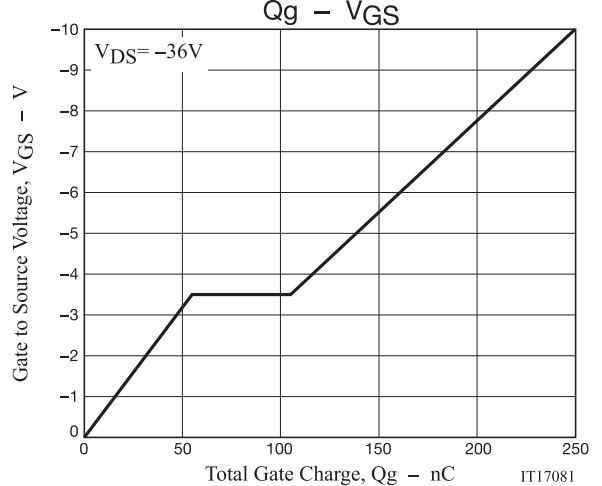
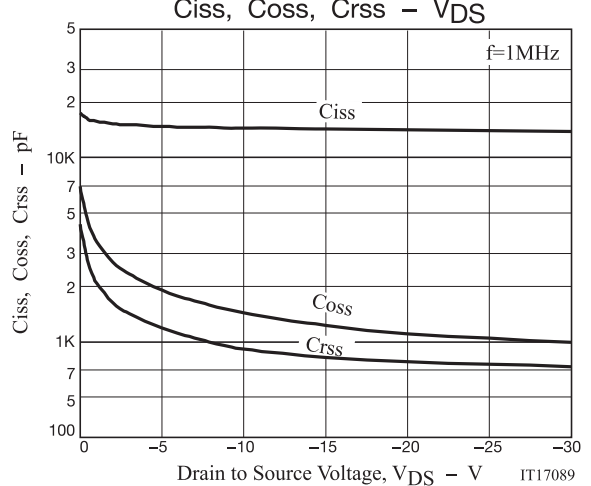
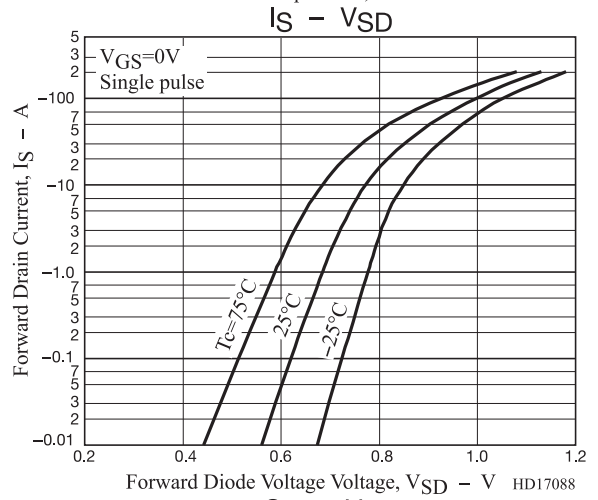
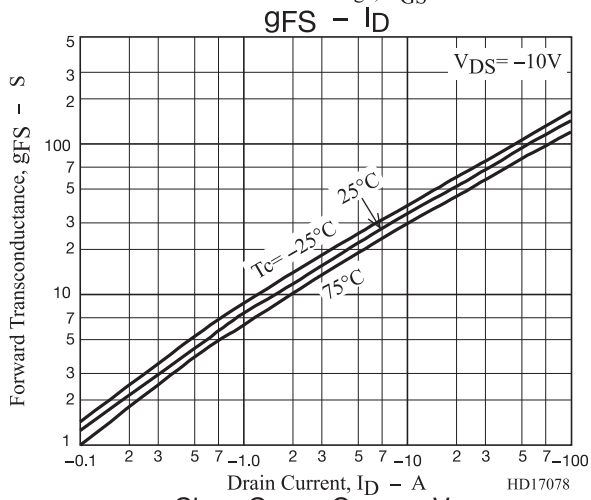
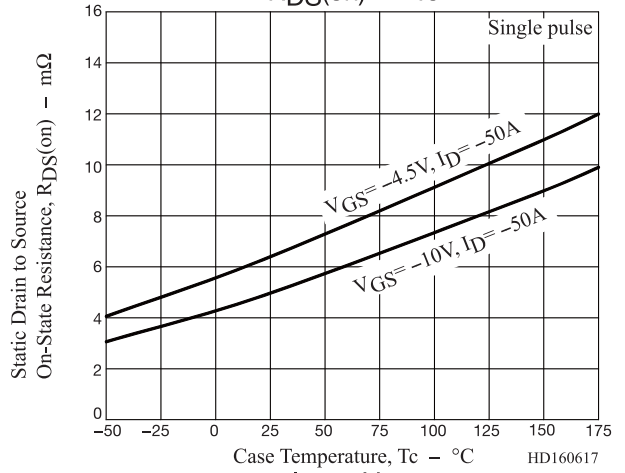
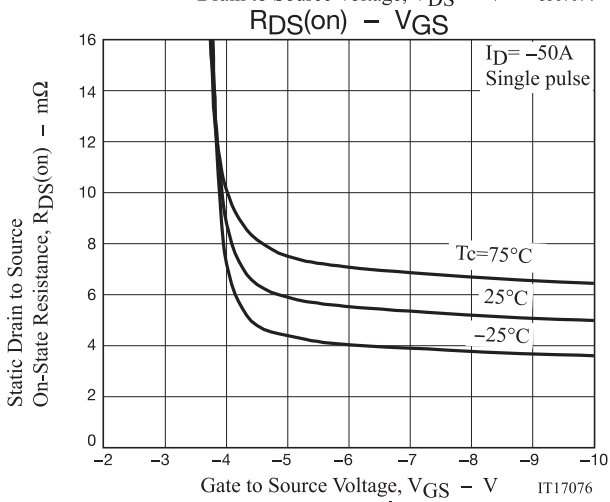
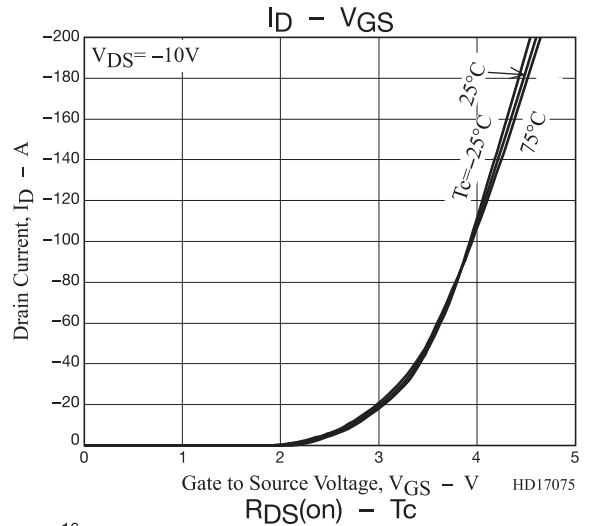
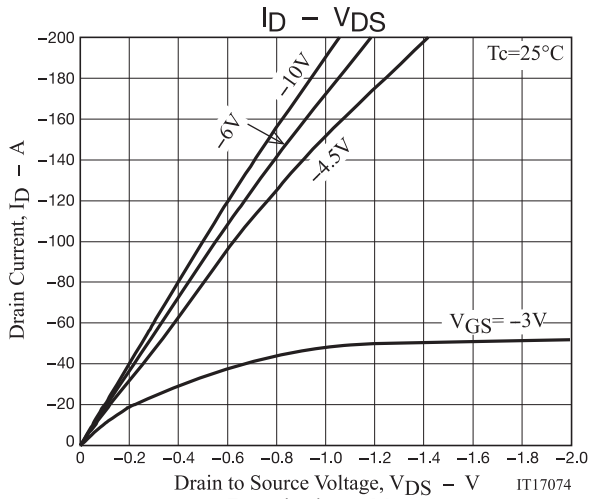


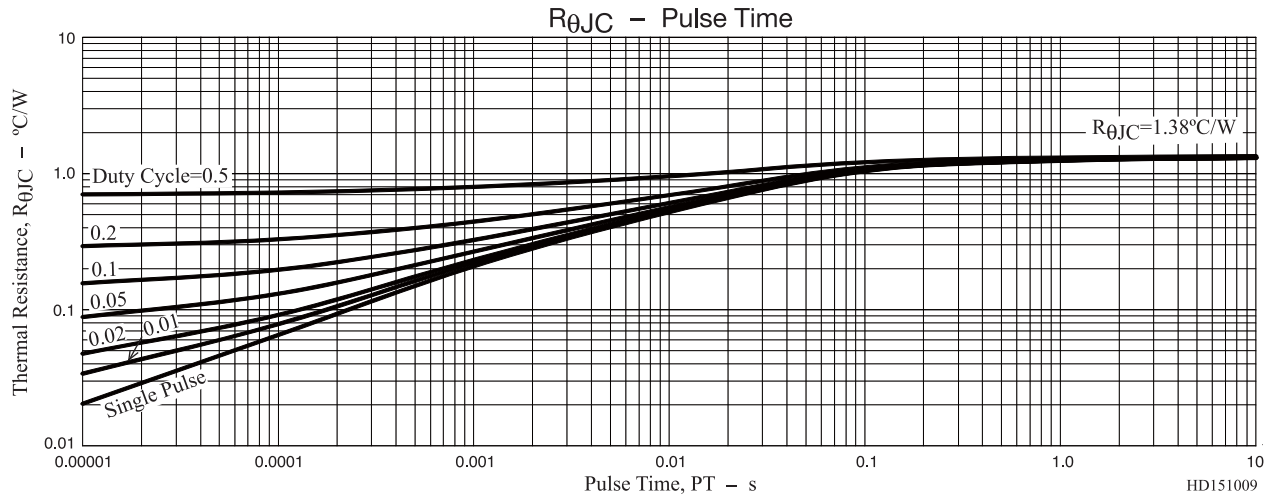
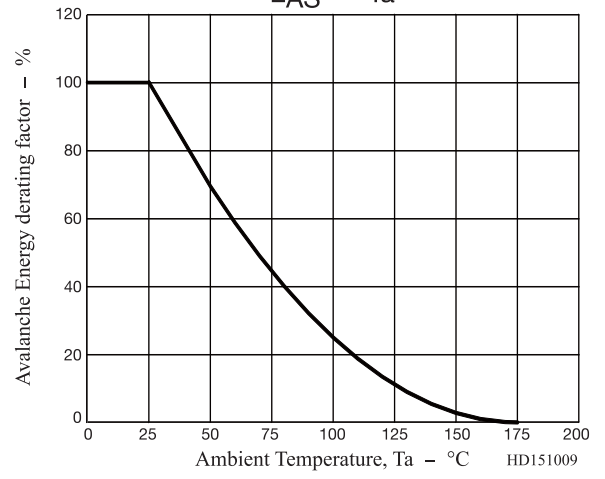
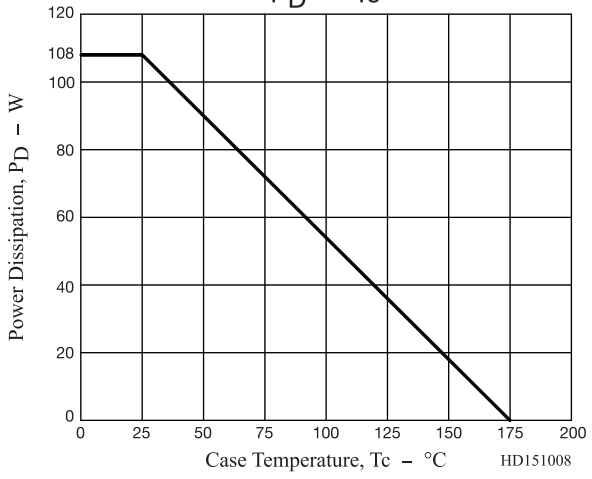
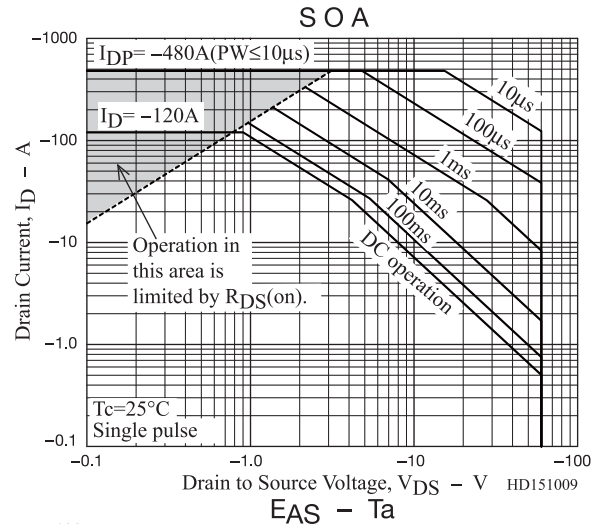
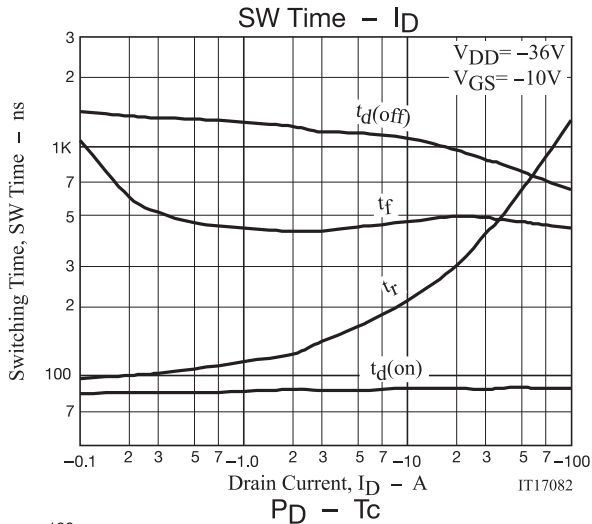
Fig.3 Reverse Recovery Time Test Circuit



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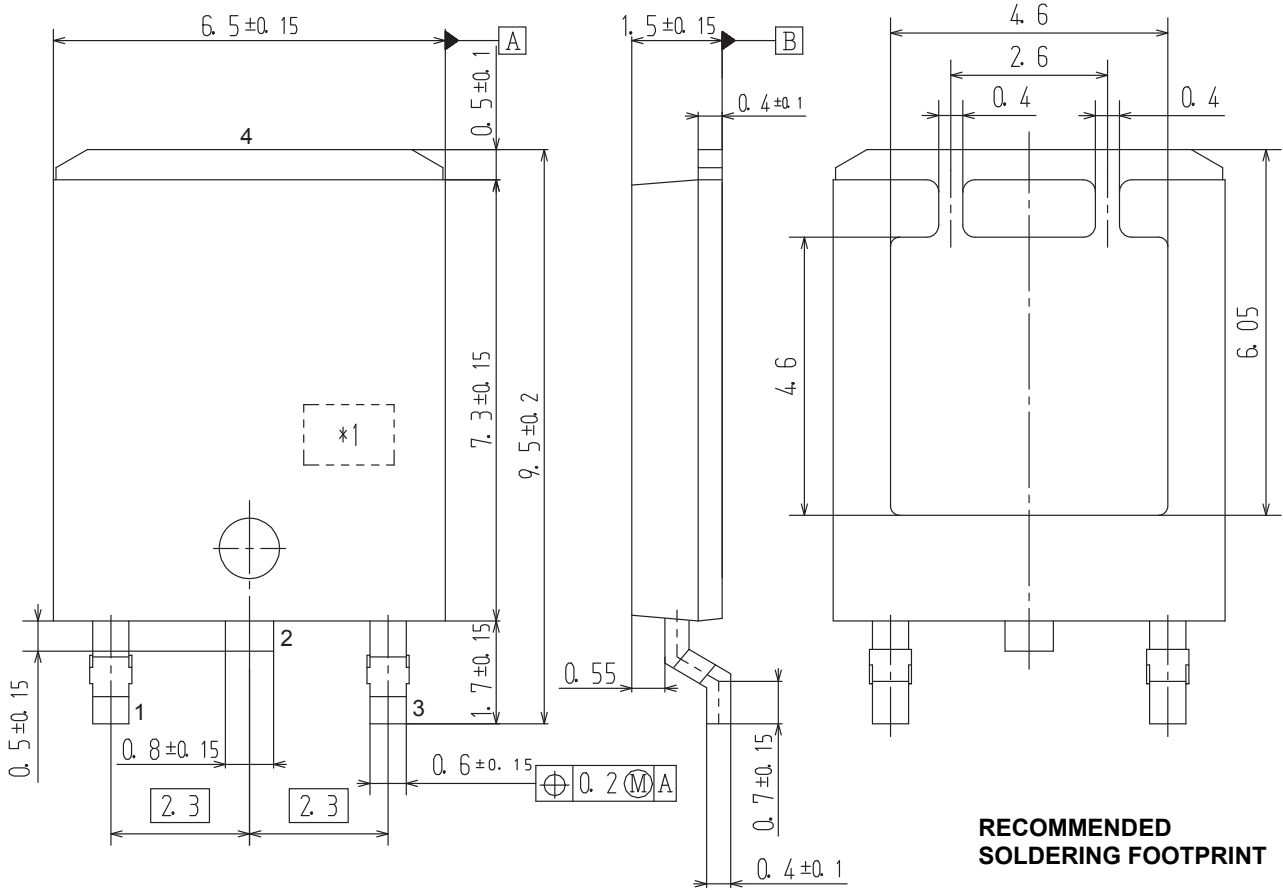
PACKAGE DIMENSIONS

unit : mm

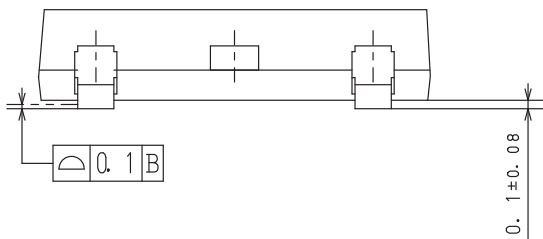
DPAK (Single Gauge) / ATPAK

CASE 369AM

ISSUE O



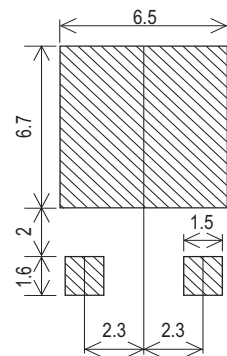
RECOMMENDED SOLDERING FOOTPRINT



- 1 : Gate
- 2 : Drain
- 3 : Source
- 4 : Drain

Pin2 is idle pin with electrical designation only carried

*1:Lot indication



NVATS5A304PLZ

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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