

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 $T_a = 25^\circ\text{C}$ (Note 1)

Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DS}	–60	V
Gate to Source Voltage	V_{GS}	± 20	V
Drain Current (DC)	I_D	–120	A
Drain Current (Pulse) $PW \leq 10\mu\text{s}$, duty cycle $\leq 1\%$	I_{DP}	–480	A
Power Dissipation $T_c = 25^\circ\text{C}$	P_D	108	W
Operating Junction and Storage Temperature	T_J, T_{stg}	–55 to +175	$^\circ\text{C}$
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 : $V_{DD} = -36\text{ V}$, $L = 100\mu\text{H}$, $I_{AV} = -75\text{ A}$ (Fig.1)

3 : $L \leq 100\mu\text{H}$, Single pulse

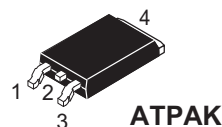
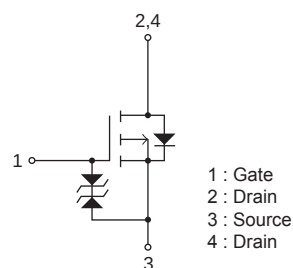
THERMAL RESISTANCE RATINGS

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

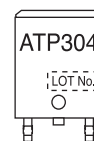
Note 4 : Surface mounted on FR4 board using a 130 mm^2 , 1 oz. Cu pad.

V_{DS}	$R_{DS(on)}$ 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	$V_{(BR)DSS}$	$I_D = -1 \text{ mA}$, $V_{GS} = 0 \text{ V}$	-60			V
Zero-Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60 \text{ V}$, $V_{GS} = 0 \text{ V}$			-10	μA
Gate to Source Leakage Current	I_{GSS}	$V_{GS} = \pm 16 \text{ V}$, $V_{DS} = 0 \text{ V}$			± 10	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = -10 \text{ V}$, $I_D = -1 \text{ mA}$	-1.2		-2.6	V
Forward Transconductance	g_{FS}	$V_{DS} = -10 \text{ V}$, $I_D = -50 \text{ A}$		100		S
Static Drain to Source On-State Resistance	$R_{DS(on)1}$	$I_D = -50 \text{ A}$, $V_{GS} = -10 \text{ V}$		5.0	6.5	$\text{m}\Omega$
	$R_{DS(on)2}$	$I_D = -50 \text{ A}$, $V_{GS} = -4.5 \text{ V}$		6.4	8.9	$\text{m}\Omega$
Input Capacitance	C_{iss}	$V_{DS} = -20 \text{ V}$, $f = 1 \text{ MHz}$		13,000		pF
Output Capacitance	C_{oss}			1,080		pF
Reverse Transfer Capacitance	C_{rss}			760		pF
Turn-ON Delay Time	$t_{d(on)}$	See Fig.2		80		ns
Rise Time	t_r			650		ns
Turn-OFF Delay Time	$t_{d(off)}$			780		ns
Fall Time	t_f			460		ns
Total Gate Charge	Q_g	$V_{DS} = -36 \text{ V}$, $V_{GS} = -10 \text{ V}$, $I_D = -100 \text{ A}$		250		nC
Gate to Source Charge	Q_{gs}			55		nC
Gate to Drain "Miller" Charge	Q_{gd}			50		nC
Forward Diode Voltage	V_{SD}	$I_S = -100 \text{ A}$, $V_{GS} = 0 \text{ V}$		-1.0	-1.5	V
Reverse Recovery Time	t_{rr}	See Fig.3		90		ns
Reverse Recovery Charge	Q_{rr}			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

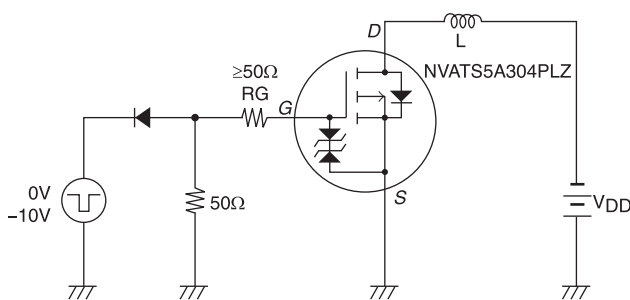


Fig.2 Switching Time Test Circuit

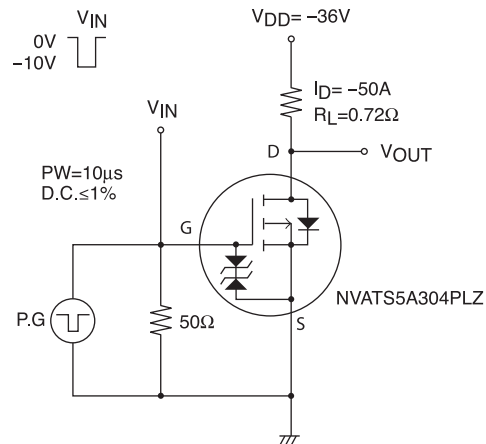
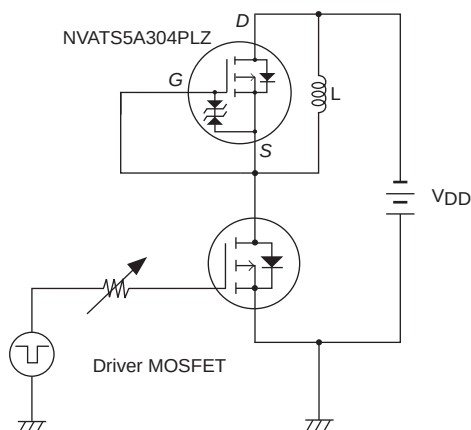
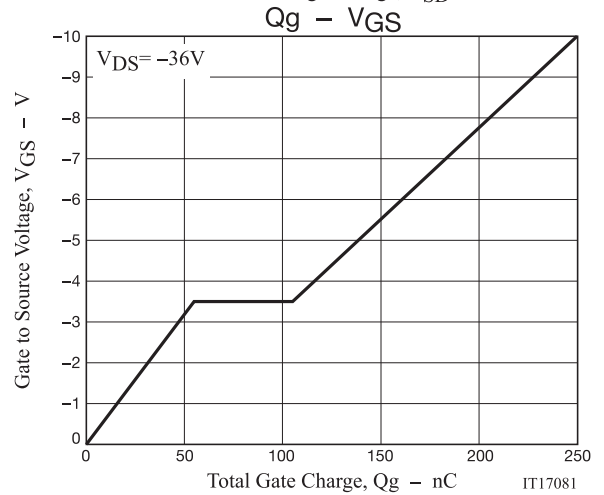
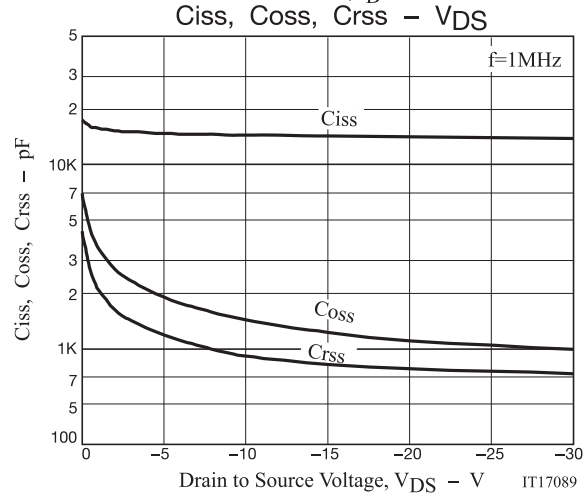
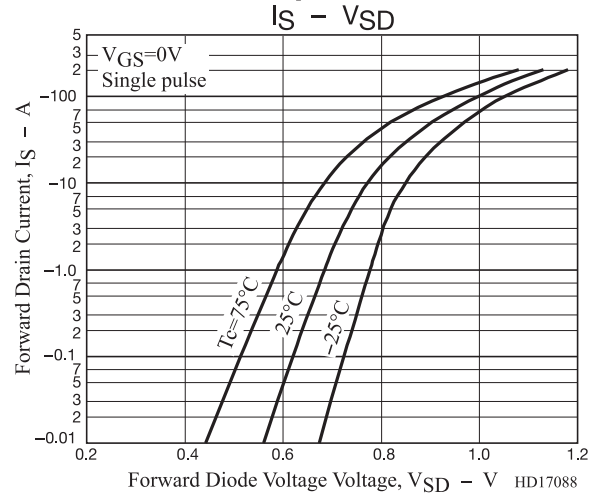
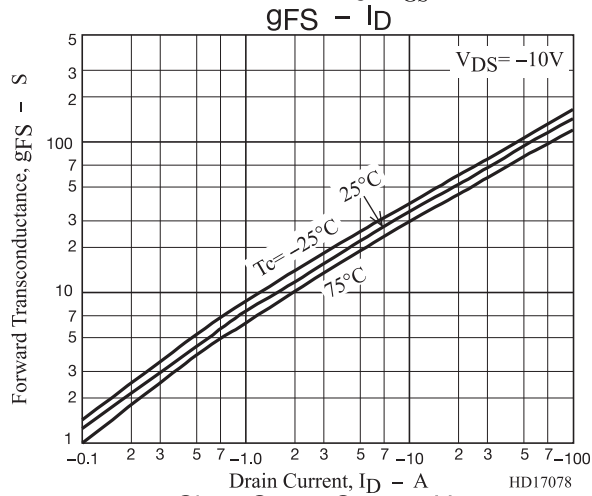
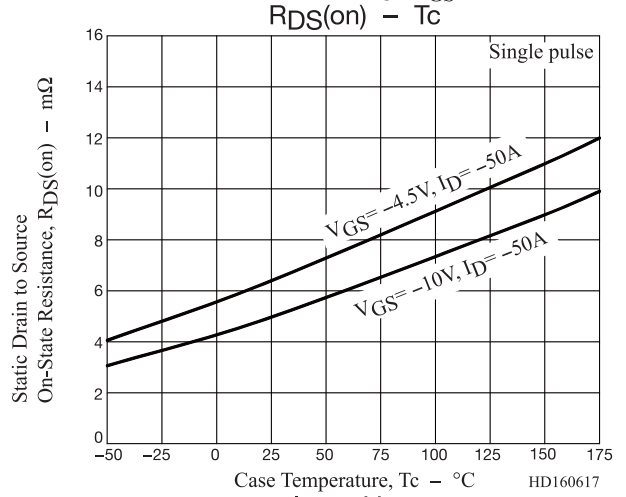
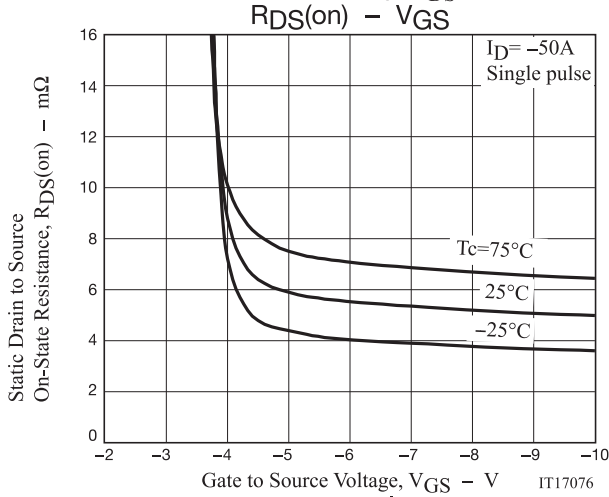
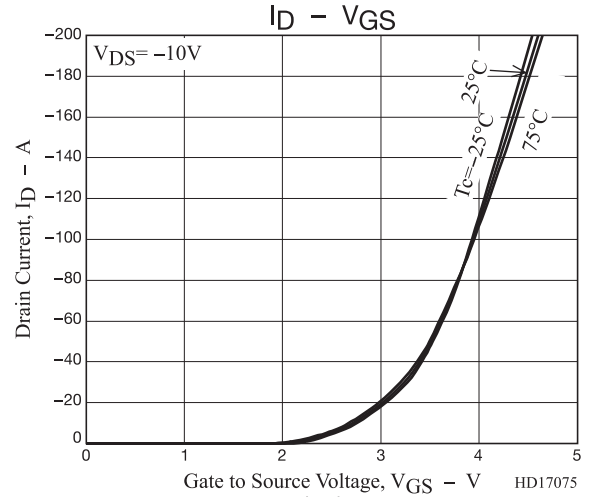
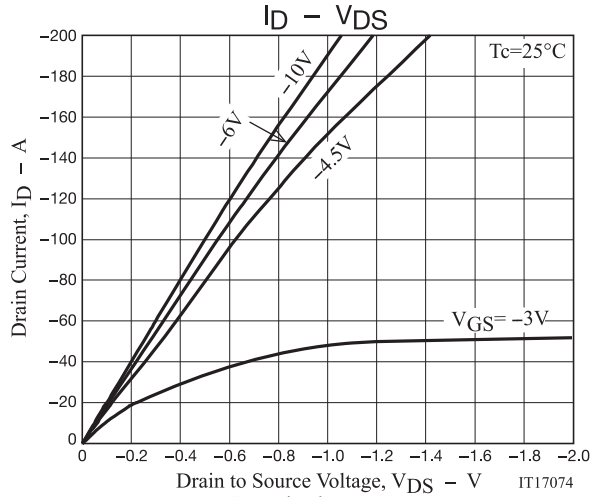


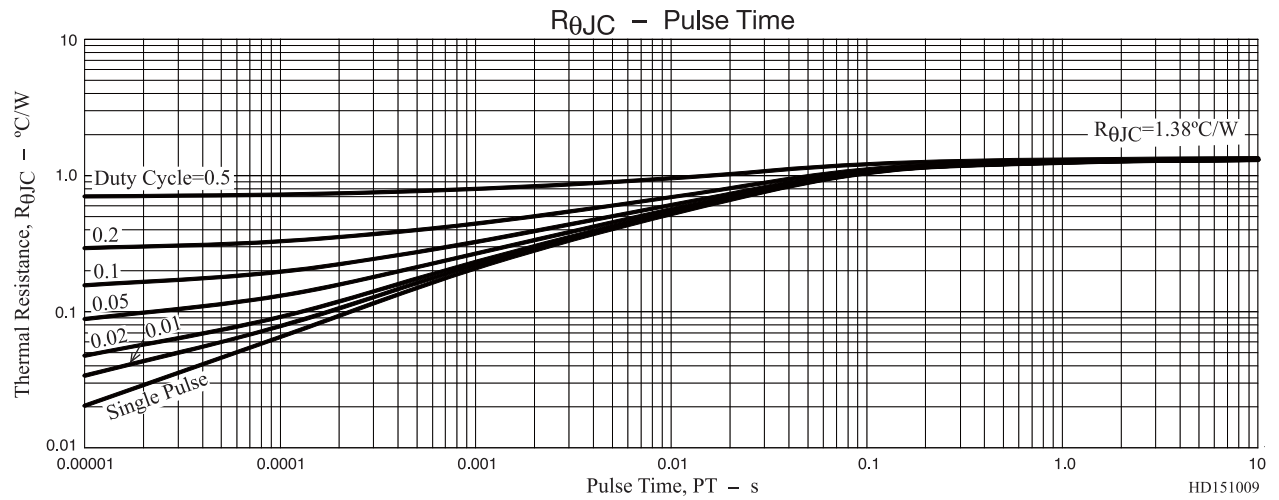
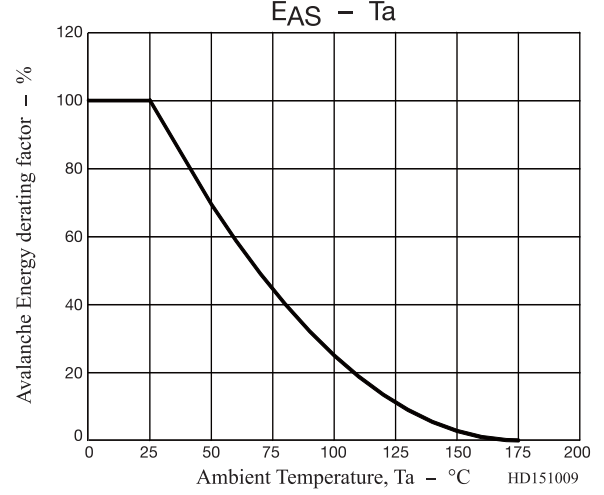
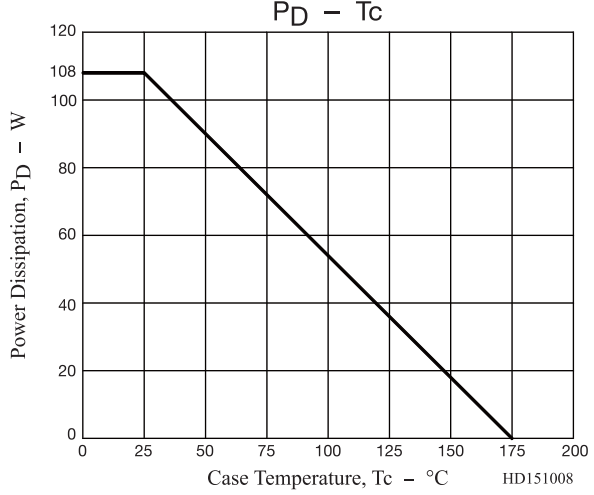
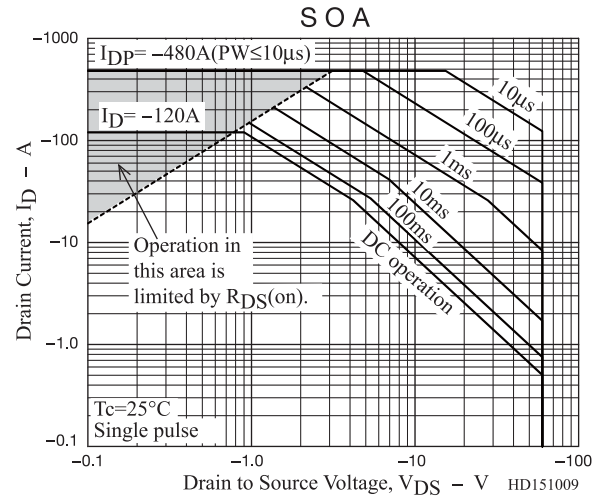
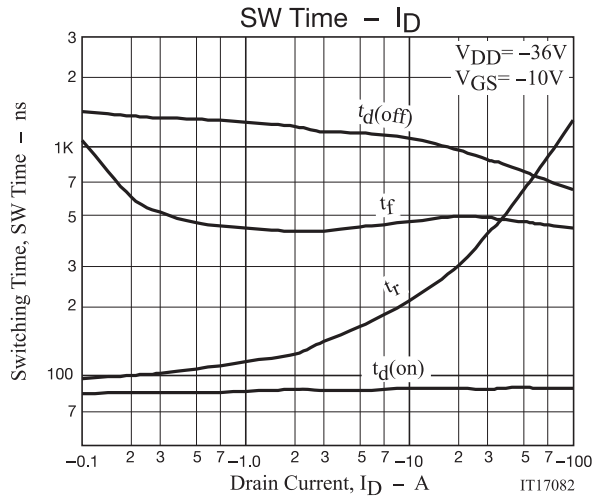
Fig.3 Reverse Recovery Time Test Circuit



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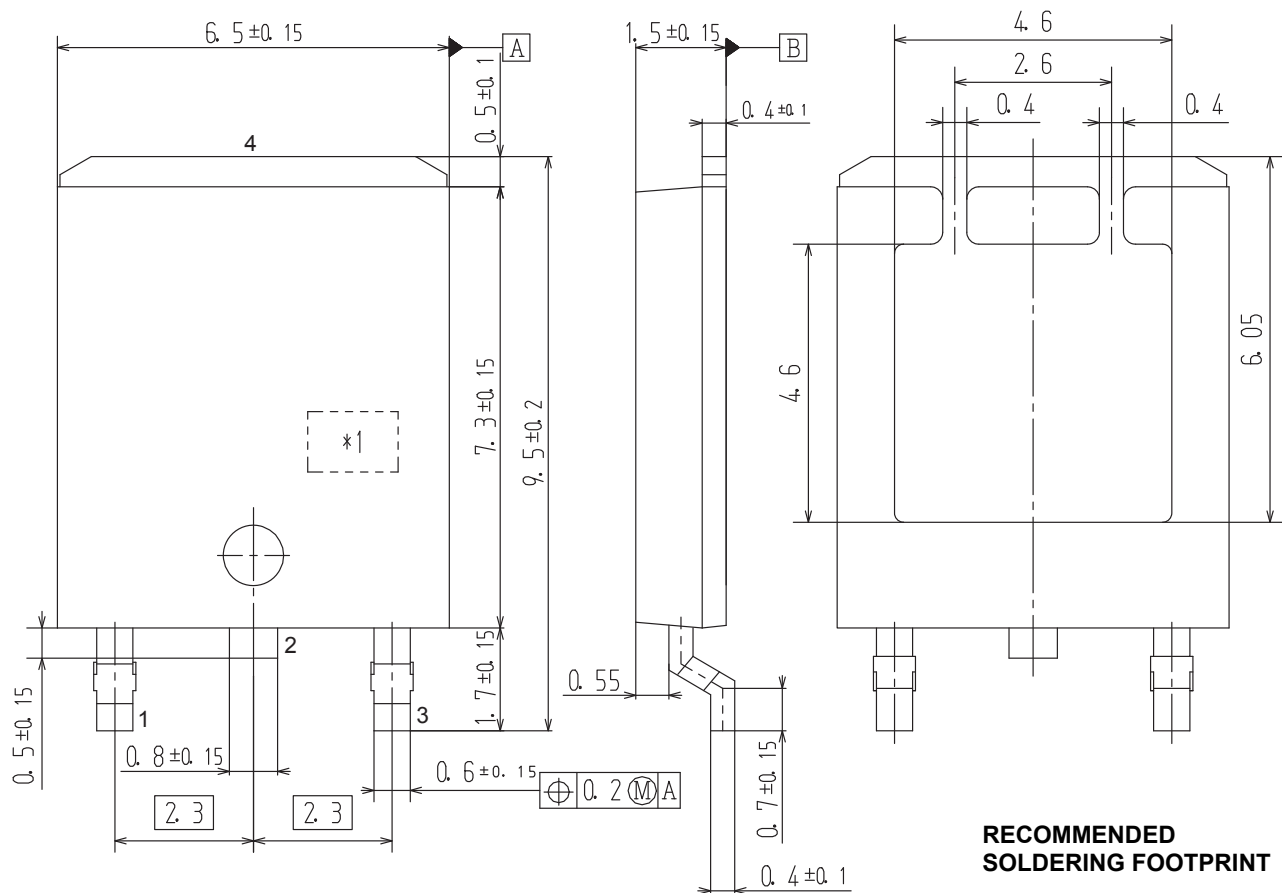
PACKAGE DIMENSIONS

unit : mm

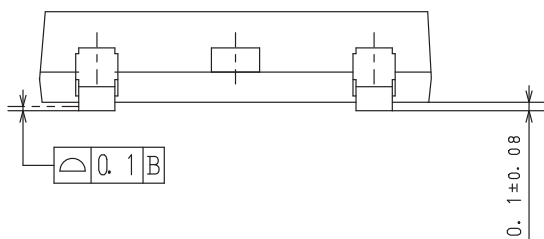
DPAK (Single Gauge) / ATPAK

CASE 369AM

ISSUE 0



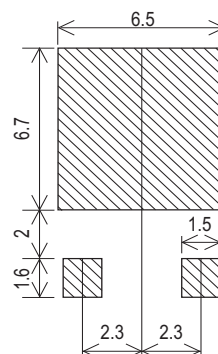
RECOMMENDED SOLDERING FOOTPRINT



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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