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NVATS4A104PZ

Power MOSFET
–30 V, 8.4 mΩ, –82 A, P-Channel

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The NVATS4A104PZ is a power MOSFET designed for compact size and high efficiency which can achieve high thermal performance.
AEC-Q101 qualified MOSFET and PPAP capable suitable for automotive applications.

V_{DSS}	R_{DS}(on) Max	I_D Max
–30 V	8.4 mΩ @ –10 V	–82 A
	13.5 mΩ @ –4.5 V	

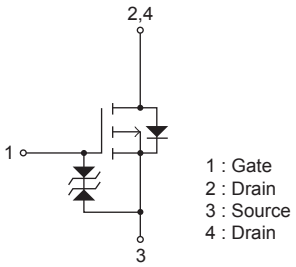
Features

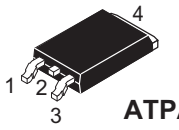
- Low On-Resistance
- High Current Capability
- 100% Avalanche Tested
- AEC-Q101 qualified and PPAP capable
- ATPAK package is pin-compatible with DPAK (TO-252)
- Pb-Free, Halogen Free and RoHS compliance

Typical Applications

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

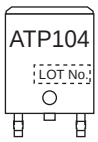
ELECTRICAL CONNECTION
P-Channel





ATPAK

MARKING



SPECIFICATIONS

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

Parameter	Symbol	Value	Unit
Drain to Source Voltage	V_{DSS}	–30	V
Gate to Source Voltage	V_{GSS}	±20	V
Drain Current (DC)	I_D	–82	A
Drain Current (Pulse) PW ≤ 10 μs, duty cycle ≤ 1%	I_{DP}	–246	A
Power Dissipation Tc = 25°C	P_D	72	W
Operating Junction and Storage Temperature	Tj, Tstg	–55 to +175	°C
Avalanche Energy (Single Pulse) (Note 2)	E_{AS}	130	mJ
Avalanche Current (Note 3)	I_{AV}	–38	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} = –15 V, L = 100 μH, I_{AV} = –38 A

3 : L ≤ 100 μH, Single pulse

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Value	Unit
Junction to Case Steady State (Tc = 25°C)	$R_{\theta JC}$	2.0	°C/W
Junction to Ambient (Note 4)	$R_{\theta JA}$	79.6	°C/W

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

ORDERING INFORMATION

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

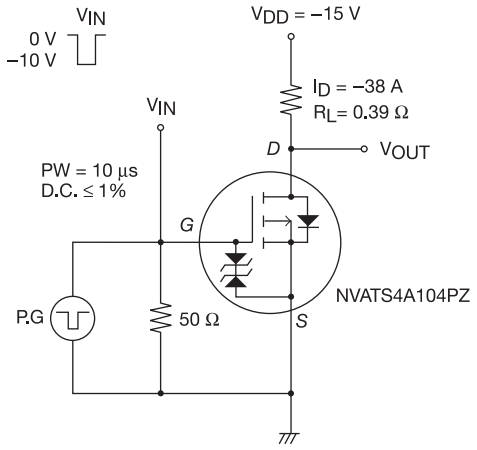
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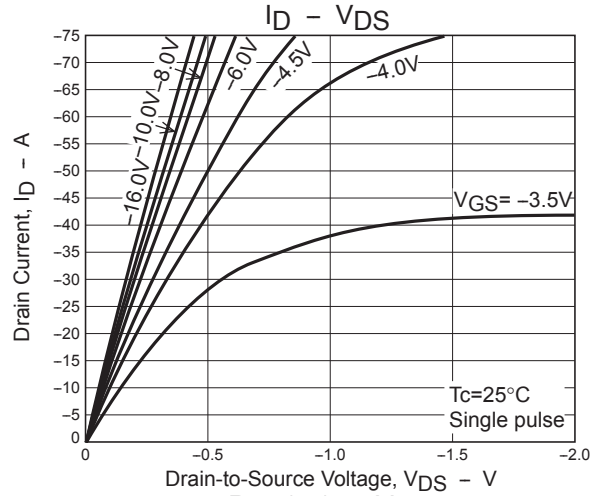
ELECTRICAL CHARACTERISTICS at Ta = 25°C (Note 5)

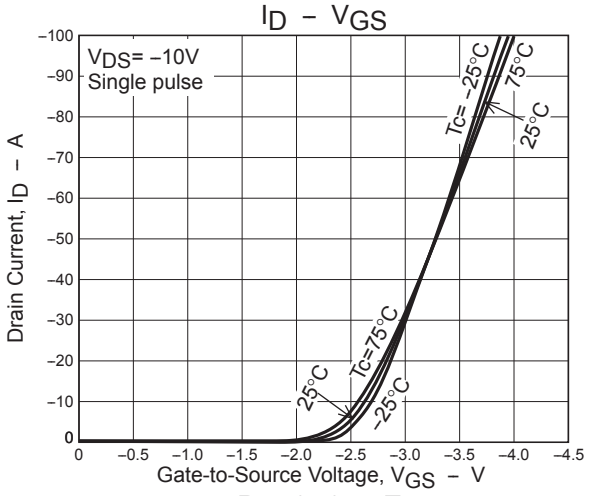
Parameter	Symbol	Conditions	Value			Unit
			min	typ	max	
Drain to Source Breakdown Voltage	$V_{(BR)DSS}$	I_D = −1 mA, V_{GS} = 0 V	−30			V
Zero-Gate Voltage Drain Current	I_{DSS}	V_{DS} = −30 V, V_{GS} = 0 V			−1	μA
Gate to Source Leakage Current	I_{GSS}	V_{GS} = ±16 V, V_{DS} = 0 V			±10	μA
Gate Threshold Voltage	$V_{GS}(th)$	V_{DS} = −10 V, I_D = −1 mA	−1.2		−2.6	V
Forward Transconductance	g_{FS}	V_{DS} = −10 V, I_D = −38 A		70		S
Static Drain to Source On-State Resistance	$R_{DS}(on)1$	I_D = −38 A, V_{GS} = −10 V		6.4	8.4	mΩ
	$R_{DS}(on)2$	I_D = −19 A, V_{GS} = −4.5 V		9.6	13.5	mΩ
Input Capacitance	Ciss	V_{DS} = −10 V, f = 1 MHz		3,950		pF
Output Capacitance	Coss			880		pF
Reverse Transfer Capacitance	Crss			610		pF
Turn-ON Delay Time	$t_d(on)$	See Fig.1		24		ns
Rise Time	t_r			520		ns
Turn-OFF Delay Time	$t_d(off)$			290		ns
Fall Time	t_f			260		ns
Total Gate Charge	Qg	V_{DS} = −15 V, V_{GS} = −10 V, I_D = −75 A		76		nC
Gate to Source Charge	Qgs			18		nC
Gate to Drain “Miller” Charge	Qgd			13		nC
Forward Diode Voltage	V_{SD}	I_S = −75 A, V_{GS} = 0 V		−1.02	−1.5	V

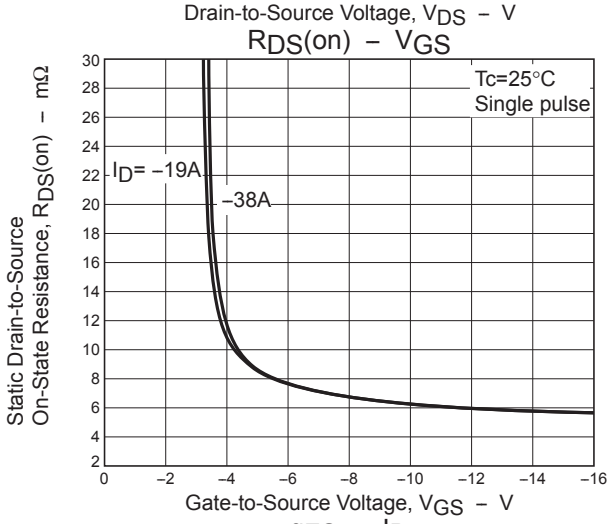
Note 5 : Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

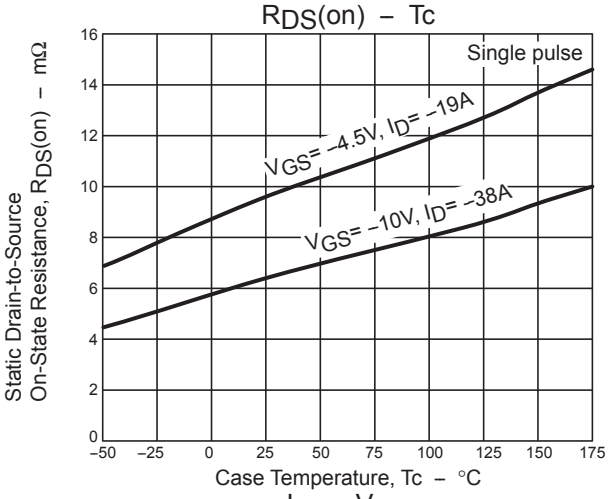
Fig.1 Switching Time Test Circuit

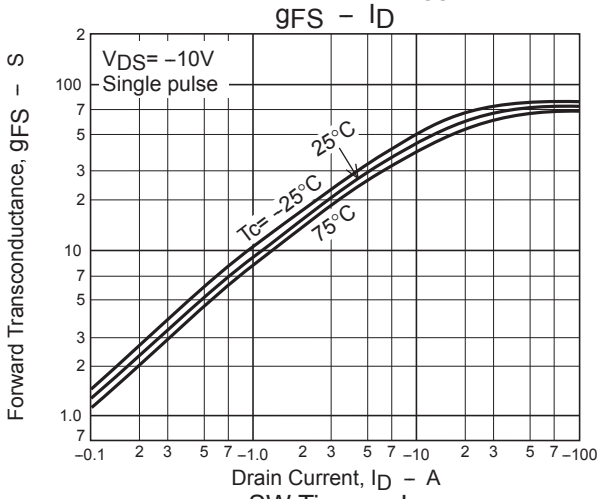


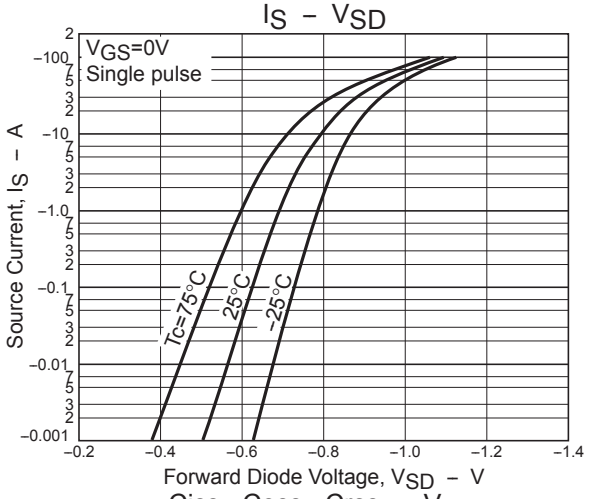

I_D – V_{DS}
Drain Current, I_D – A
Drain-to-Source Voltage, V_{DS} – V
–16.0V
–10.0V
–8.0V
–6.0V
–4.5V
–4.0V
V_{GS}= –3.5V
Tc=25°C
Single pulse

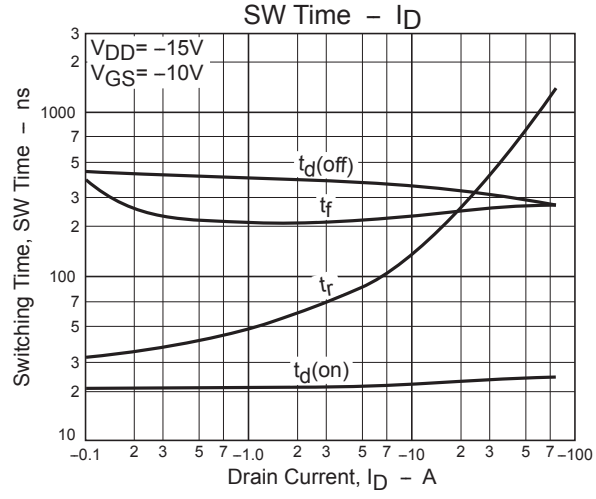

I_D – V_{GS}
Drain Current, I_D – A
Gate-to-Source Voltage, V_{GS} – V
V_{DS}= –10V
Single pulse
Tc= –25°C
75°C
25°C
25°C
Tc=75°C
–25°C

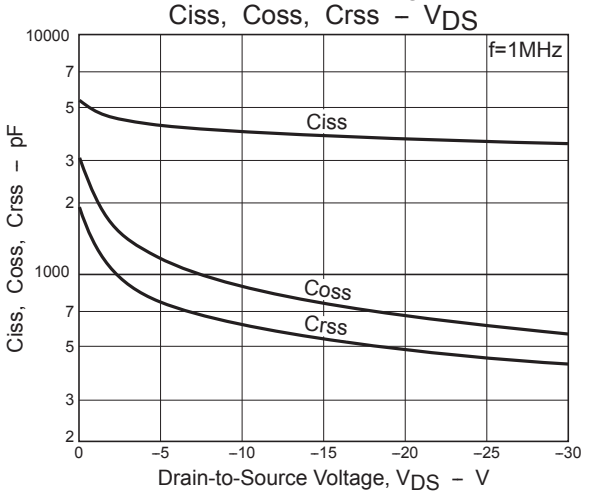

$R_{DS(on)}$ – V_{GS}
Static Drain-to-Source On-State Resistance, $R_{DS(on)}$ – mΩ
Gate-to-Source Voltage, V_{GS} – V
Tc=25°C
Single pulse
I_D= –19A
–38A

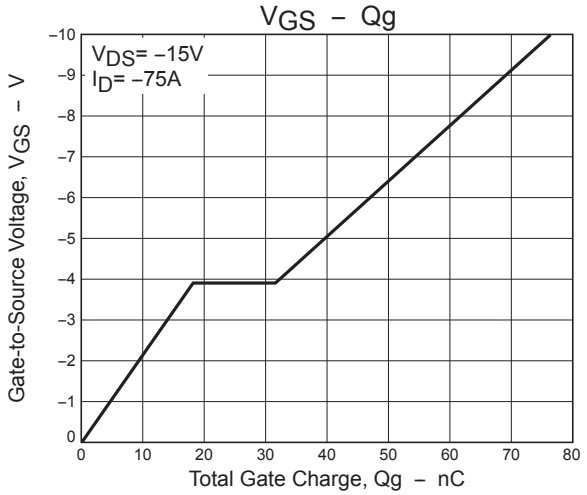

$R_{DS(on)}$ – Tc
Static Drain-to-Source On-State Resistance, $R_{DS(on)}$ – mΩ
Case Temperature, Tc – °C
Single pulse
V_{GS}= –4.5V, I_D= –19A
V_{GS}= –10V, I_D= –38A

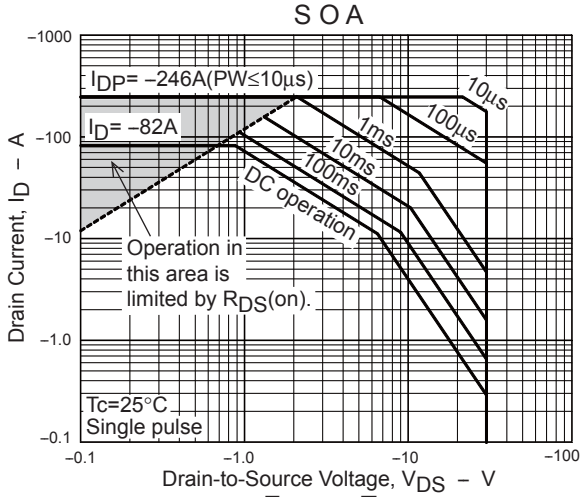

gFS – I_D
Forward Transconductance, gFS – S
Drain Current, I_D – A
V_{DS}= –10V
Single pulse
25°C
Tc= –25°C
75°C

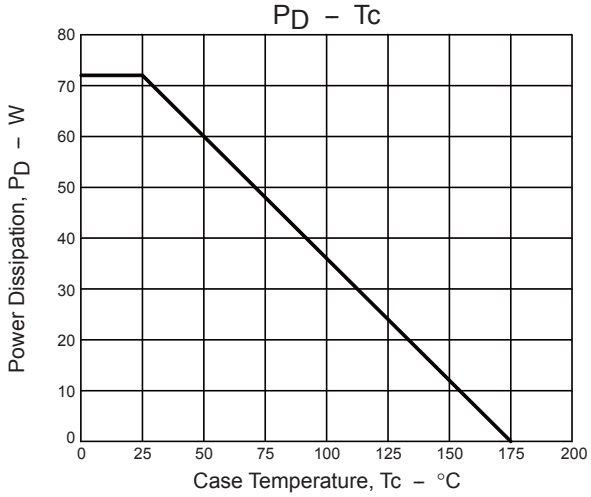

I_S – V_{SD}
Source Current, I_S – A
Forward Diode Voltage, V_{SD} – V
V_{GS}=0V
Single pulse
Tc=75°C
25°C
–25°C

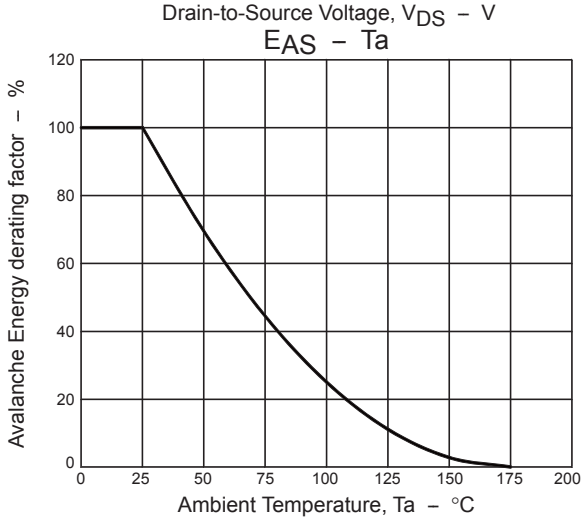

SW Time – I_D
Switching Time, SW Time – ns
Drain Current, I_D – A
V_{DD}= –15V
V_{GS}= –10V
$t_{d(off)}$
t_f
t_r
$t_{d(on)}$

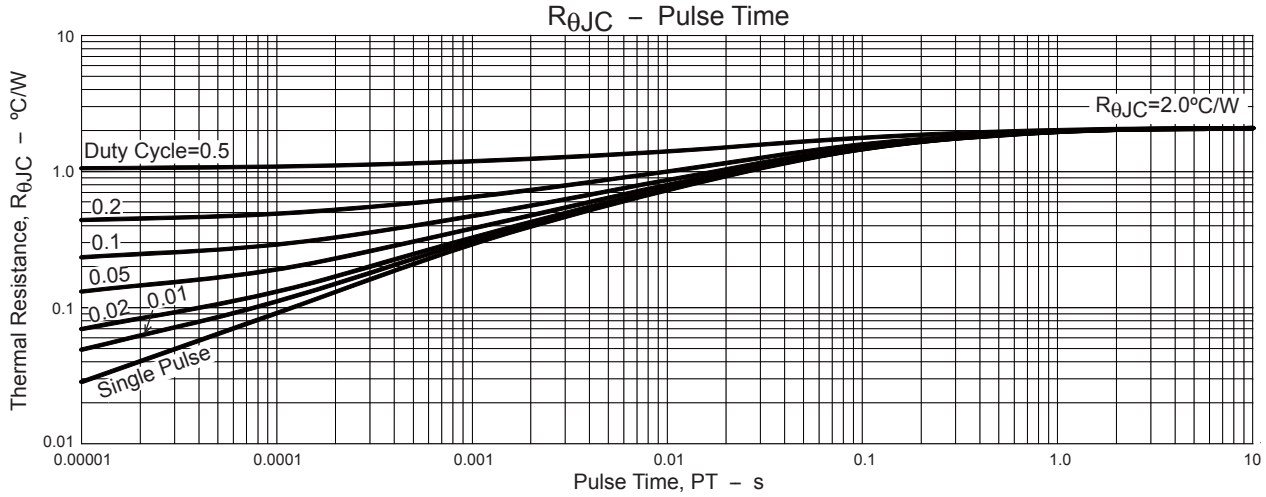

Ciss, Coss, Crss – V_{DS}
Ciss, Coss, Crss – pF
Drain-to-Source Voltage, V_{DS} – V
f=1MHz
Ciss
Coss
Crss


VGS – Qg
VDS= –15V
ID= –75A
Gate-to-Source Voltage, VGS – V
Total Gate Charge, Qg – nC


S O A
IDP= –246A(PW≤10μs)
ID= –82A
10μs
100μs
1ms
10ms
100ms
DC operation
Operation in this area is limited by RDS(on).
Tc=25°C
Single pulse
Drain Current, ID – A
Drain-to-Source Voltage, VDS – V

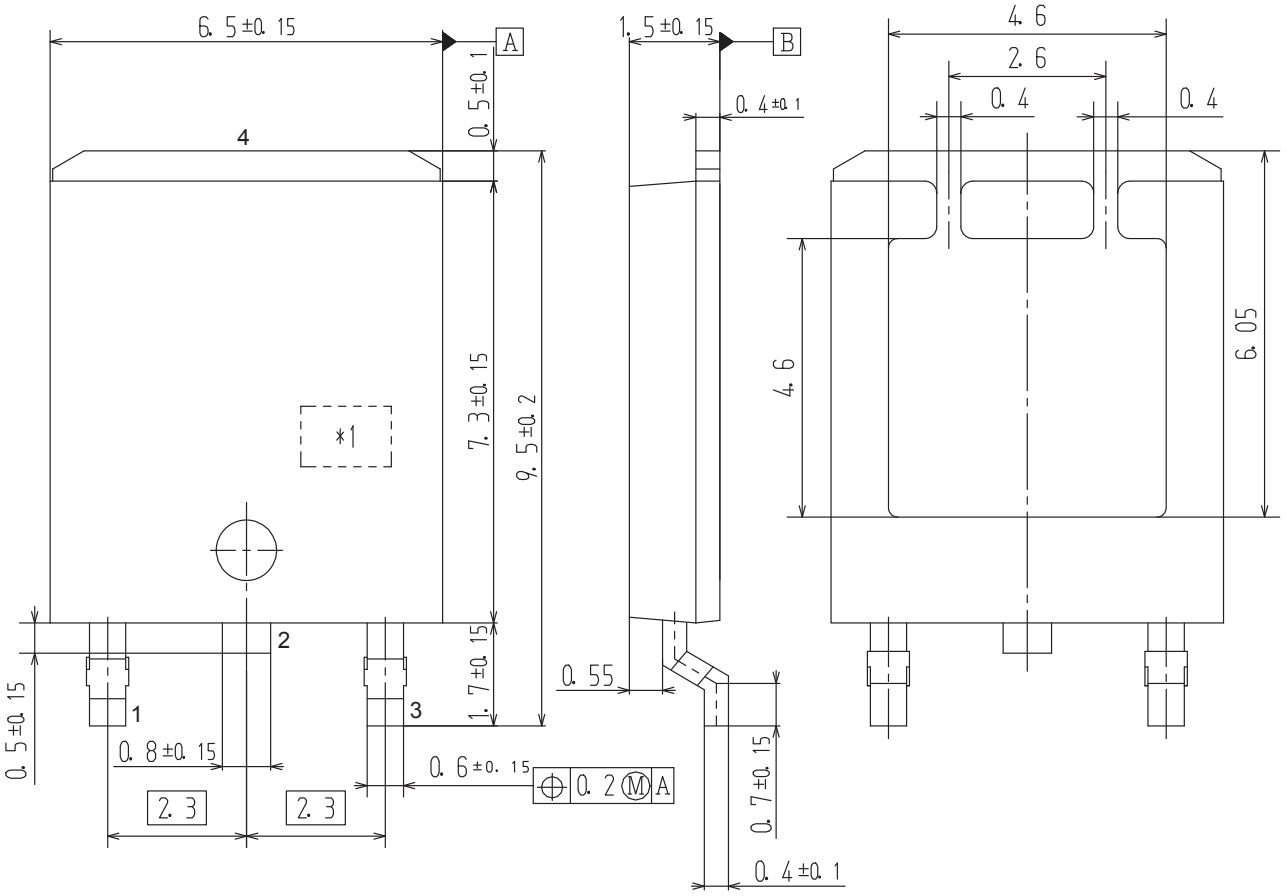

PD – Tc
Power Dissipation, PD – W
Case Temperature, Tc – °C

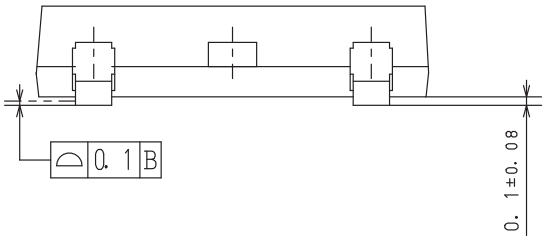

EAS – Ta
Avalanche Energy derating factor – %
Ambient Temperature, Ta – °C


RθJC – Pulse Time
RθJC=2.0°C/W
Duty Cycle=0.5
0.2
0.1
0.05
0.02
0.01
Single Pulse
Thermal Resistance, RθJC – °C/W
Pulse Time, PT – s

PACKAGE DIMENSIONS
unit : mm

DPAK (Single Gauge) / ATPAK
CASE 369AM
ISSUE O



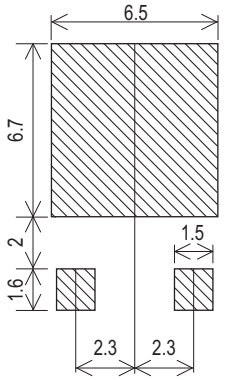


Pin2 is idle pin with electrical designation only carried

*1:Lot indication

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

RECOMMENDED SOLDERING FOOTPRINT



ORDERING INFORMATION

Device	Marking	Package	Shipping (Qty / Packing)
NVATS4A104PZT4G	ATP104	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 NVATS4A104PZ is a MOSFET product, please avoid using this device in the vicinity of highly charged objects.

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