



## Description

The NVATS5A302PLZT4G uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

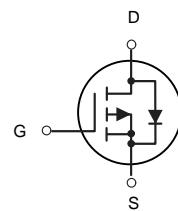


**TO-252-2L**

## General Features

$V_{DS} = -60V$   $I_D = -80A$

$R_{DS(ON)} < 13m\Omega$  @  $V_{GS} = -10V$



P-Channel MOSFET

## Application

Battery protection

Load switch

Uninterruptible power supply

## Package Marking and Ordering Information

Product ID	Pack	Brand	Qty(PCS)
NVATS5A302PLZT4G	TO-252-2L	HXY MOSFET	2500

## Absolute Maximum Ratings ( $T_c = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Rating	Units
$V_{DS}$	Drain-Source Voltage	-60	V
$V_{GS}$	Gate-Source Voltage	$\pm 20$	V
$I_D @ T_c = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-80	A
$I_D @ T_c = 100^\circ C$	Continuous Drain Current, $V_{GS} @ 10V^1$	-50	A
$I_D$	Pulsed Drain Current <sup>1</sup>	-320	A
ESA	Single Pulse Avalanche Energy <sup>2</sup>	450	mJ
$P_D @ T_c = 25^\circ C$	Total Power Dissipation <sup>4</sup>	110	W
TSTG	Storage Temperature Range	-55 to 150	°C
$T_J$	Operating Junction Temperature Range	-55 to 150	°C
$R_{eJC}$	Thermal Resistance Junction-Case <sup>1</sup>	1.1	°C/W



**Electrical Characteristics (T<sub>J</sub>=25°C, unless otherwise noted)**

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV <sub>DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =-250uA	-60	---	---	V
△BV <sub>DSS</sub> /△T <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =-1mA	---	-0.035	---	V/°C
R <sub>DS(on)</sub>	Static Drain-Source On-Resistance <sup>2</sup>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-20A	---	11	13	mΩ
		V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-15A	---	12	14	
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =-250uA	-1.3	---	-2.3	V
△V <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient		---	4.28	---	mV/°C
I <sub>DSS</sub>	Drain-Source Leakage Current	V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =25°C	---	---	1	uA
		V <sub>DS</sub> =-48V, V <sub>GS</sub> =0V, T <sub>J</sub> =55°C	---	---	5	
I <sub>GSS</sub>	Gate-Source Leakage Current	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	---	---	±100	nA
g <sub>fs</sub>	Forward Transconductance	V <sub>DS</sub> =-10V, I <sub>D</sub> =-20A	---	60	---	S
R <sub>g</sub>	Gate Resistance	V <sub>DS</sub> =0V, V <sub>GS</sub> =0V, f=1MHz	---	2	---	Ω
Q <sub>g</sub>	Total Gate Charge (-4.5V)	V <sub>DS</sub> =-20V, V <sub>GS</sub> =-4.5V, I <sub>D</sub> =-12A	---	56	---	nC
Q <sub>gs</sub>	Gate-Source Charge		---	11	---	
Q <sub>gd</sub>	Gate-Drain Charge		---	9	---	
T <sub>d(on)</sub>	Turn-On Delay Time	V <sub>DD</sub> =-30V, V <sub>GS</sub> =-10V, R <sub>G</sub> =3.3Ω, I <sub>D</sub> =-20A	---	4.5	---	ns
T <sub>r</sub>	Rise Time		---	2.5	---	
T <sub>d(off)</sub>	Turn-Off Delay Time		---	14.5	---	
T <sub>f</sub>	Fall Time		---	3.5	---	
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =-15V, V <sub>GS</sub> =0V, f=1MHz	---	3060	---	pF
C <sub>oss</sub>	Output Capacitance		---	620	---	
C <sub>rss</sub>	Reverse Transfer Capacitance		---	20	---	
I <sub>s</sub>	Continuous Source Current <sup>1,5</sup>	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current	---	---	-80	A
I <sub>SM</sub>	Pulsed Source Current <sup>2,5</sup>		---	---	-320	A
V <sub>SD</sub>	Diode Forward Voltage <sup>2</sup>	V <sub>GS</sub> =0V, I <sub>s</sub> =-1A, T <sub>J</sub> =25°C	---	---	-1	V

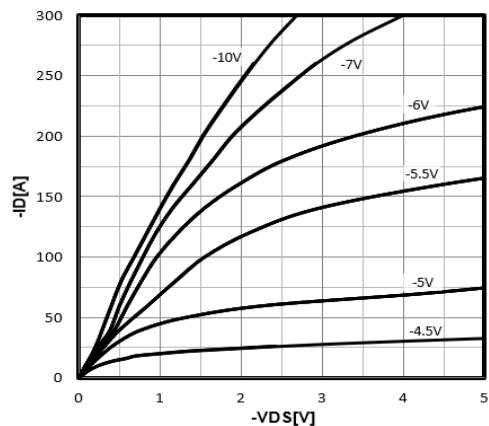
Note :

- 1.The data tested by surface mounted on a 1 inch<sup>2</sup> FR-4 board with 2OZ copper.
- 2.The data tested by pulsed , pulse width  $\leq$  300us , duty cycle  $\leq$  2%
- 3.The EAS data shows Max. rating . The test condition is V<sub>DD</sub>=-25V,V<sub>GS</sub>=-10V,L=0.1mH,I<sub>AS</sub>=-47.6A
- 4.The power dissipation is limited by 150°C junction temperature
- 5.The data is theoretically the same as I<sub>D</sub> and I<sub>DM</sub> , in real applications , should be limited by total power dissipation.

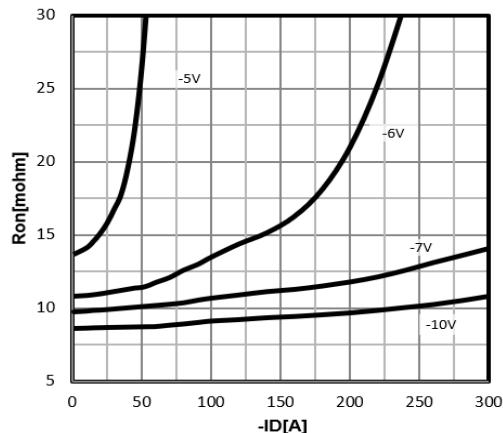


## Characteristics Curve

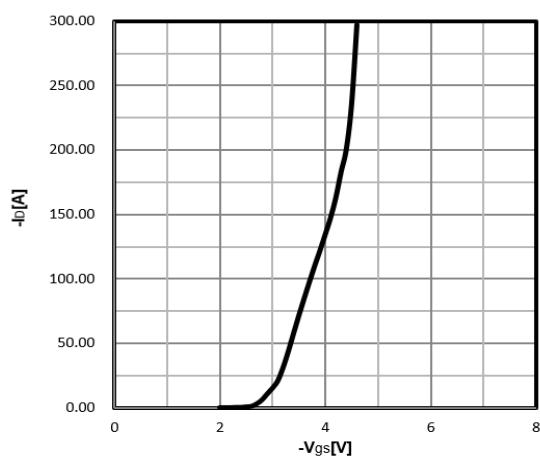
Typ. output characteristics  
 $I_D=f(V_{DS})$



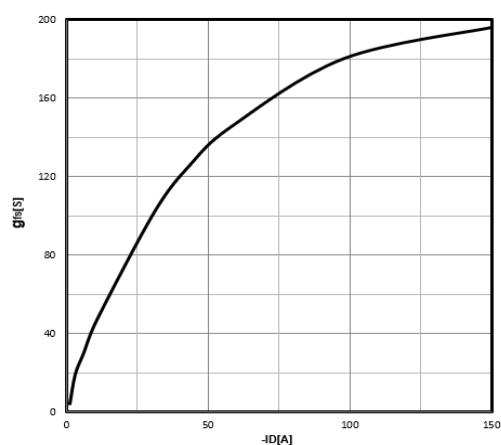
Typ. drain-source on resistance  
 $R_{DS(on)}=f(I_D)$



Typ. transfer characteristics  
 $I_D=f(V_{GS})$

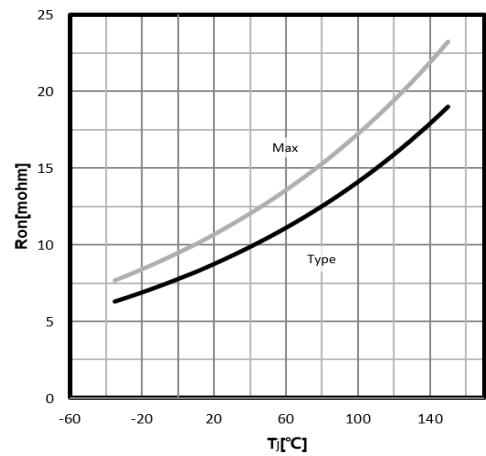


Typ. forward transconductance  
 $g_{fs}=f(I_D)$



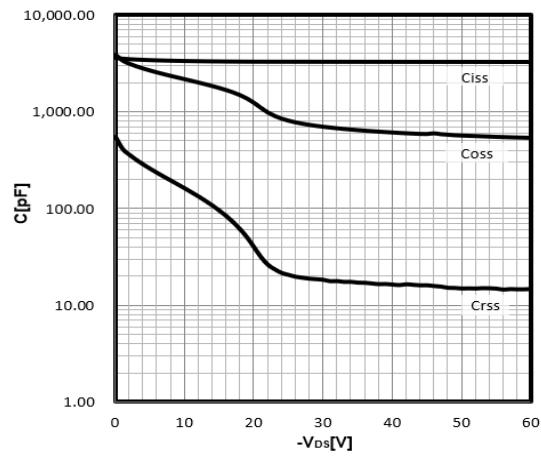
### Drain-source on-state resistance

$R_{DS(on)}=f(T_j)$ ;  $I_D=-20A$ ;  $V_{GS}=-10V$



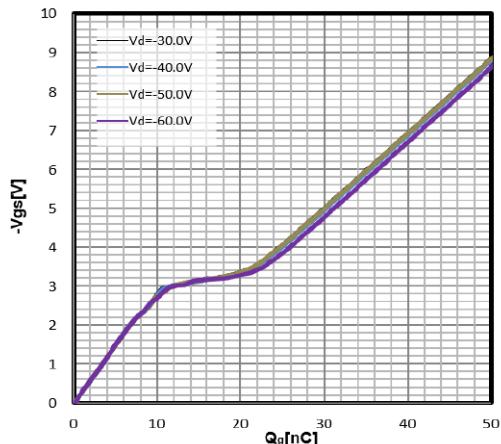
### Typ. capacitances

$C=f(V_{DS})$ ;  $V_{GS}=0V$ ;  $f=1MHz$

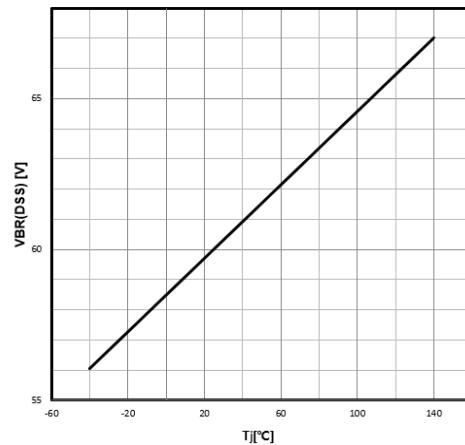




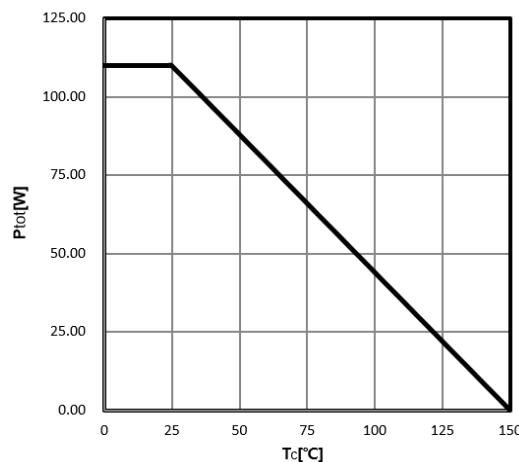
**Typ. gate charge**  
 $V_{GS}=f(Q_{gate})$ ;  $I_D=-20A$



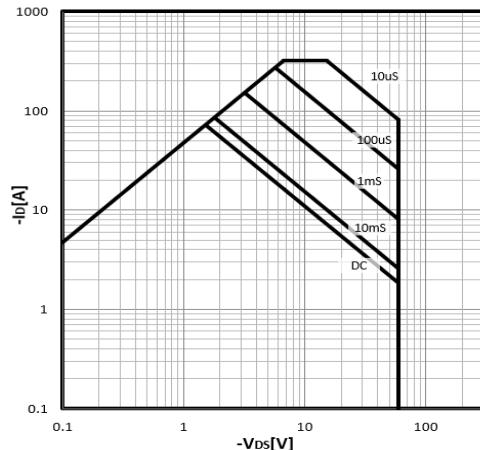
**Drain-source breakdown voltage**  
 $V_{BR(DSS)}=f(T_J)$ ;  $I_D=-250\mu A$



**Power Dissipation**  
 $P_{tot}=f(T_C)$

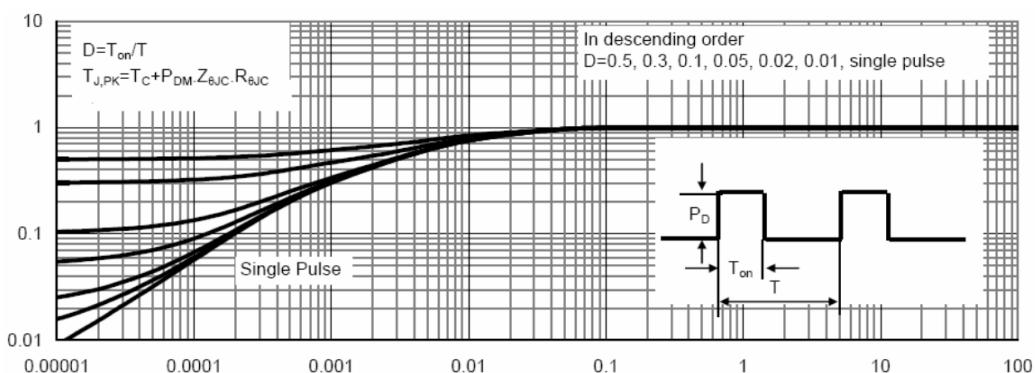


$I_D=f(V_{DS})$



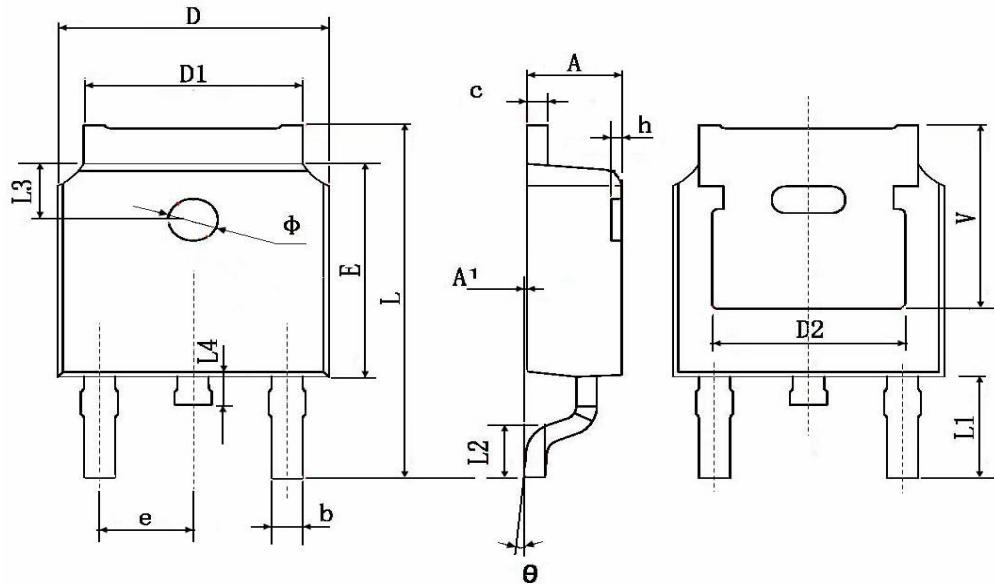
**Max. transient thermal impedance**

$$Z_{thJC}=f(t_p)$$





## TO-252-2L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.830 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	



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