

ATM6402NSA

N-Channel Enhancement Mode Field Effect Transistor

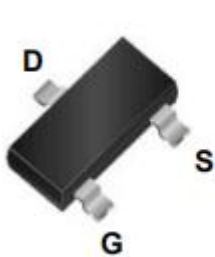
Description

The ATM6402NSA 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 load switch or in PWM applications. Standard Product ATM6402NSA is Pb-free.

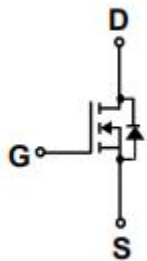
Feature

- ◆ V_{DS} (V) = 30V
- ◆ I_D = 6.1A (V_{GS} = 10V)
- ◆ $R_{DS(ON)}$ < 22m Ω (V_{GS} = 10V)
- ◆ $R_{DS(ON)}$ < 35m Ω (V_{GS} = 4.5V)

SOT-23

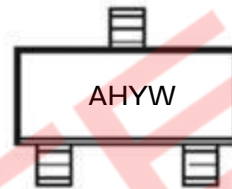


Top View



Schematic

Marking



AH : Device code
YW : Date code

Order Information

Device	Package	Shipping
ATM6402NSA	SOT-23	3000/Tape&Reel

Absolute Maximum Ratings ($T_A=25^\circ\text{C}$, unless otherwise noted)

Parameter	Symbol	Maximum	Units
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^{NOET 1}	I_D	$T_A=25^\circ\text{C}$	6.1
		$T_A=70^\circ\text{C}$	4.9
Pulsed Drain Current ^{NOET 2}	I_{DM}	46	A
Power Dissipation ^{NOET 1}	P_D	$T_A=25^\circ\text{C}$	1.25
		$T_A=70^\circ\text{C}$	0.8
Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ\text{C}$

Thermal Characteristics

Parameter	Symbol	Typ	Max	Units
Maximum Junction-to-Ambient ^{NOET 1}	$R_{\theta JA}$	$t \leq 10\text{s}$	80	$^\circ\text{C/W}$
Maximum Junction-to-Ambient ^{NOET 1}		Steady-State	104	$^\circ\text{C/W}$
Maximum Junction-to-Lead ^{NOET 3}	$R_{\theta JL}$	55	68	$^\circ\text{C/W}$

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Electrical Characteristics (T _A =25°C unless otherwise noted)						
Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	I _D =250μA, V _{GS} =0V	30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =24V, V _{GS} =0V			1	μA
Gate-Body leakage current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.6	2.0	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =10V, I _D =6.1A		18.0	22.0	mΩ
		V _{GS} =4.5V, I _D =5.6A		23.5	35.0	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5.0V, I _D =6.1A		9.5		S
Diode Forward Voltage	V _{SD}	I _S =1.0A, V _{GS} =0V		0.75	1.2	V
Dynamic Characteristics						
Input Capacitance	C _{iss}	V _{GS} =0V, V _{DS} =15V, f=1MHz		645		pF
Output Capacitance	C _{oss}			87		pF
Reverse Transfer Capacitance	C _{rss}			68		pF
Gate resistance	R _g	V _{GS} =0V, V _{DS} =0V, f=1MHz		4.5		
Switching Characteristics						
Total Gate Charge	Q _{gtot(10V)}	V _{GS} =10V, V _{DS} =15V, I _D =6.1A		14.1		nC
Total Gate Charge	Q _{gtot(4.5V)}			7.0		
Gate Source Charge	Q _{gs}			2.39		nC
Gate Drain Charge	Q _{gd}			2.36		nC
Turn-On Delay Time	t _{d(on)}	V _{GS} =10V, V _{DS} =15V, R _L =2.45Ω, R _{GEN} =3Ω		4.8		ns
Turn-On Rise Time	t _r			18.6		ns
Turn-Off Delay Time	t _{d(off)}			19.2		ns
Turn-Off Fall Time	t _f			5.4		ns

Note:

1. The value of R_{θJA} is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The value in any given application depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θJA} is the sum of the thermal impedance from junction to lead R_{θJL} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80 μs pulses, duty cycle 0.5% max.
5. These tests are performed with the device mounted on 1 in² FR-4 board with 2oz. Copper, in a still air environment with T_A=25°C. The SOA curve provides a single pulserating.

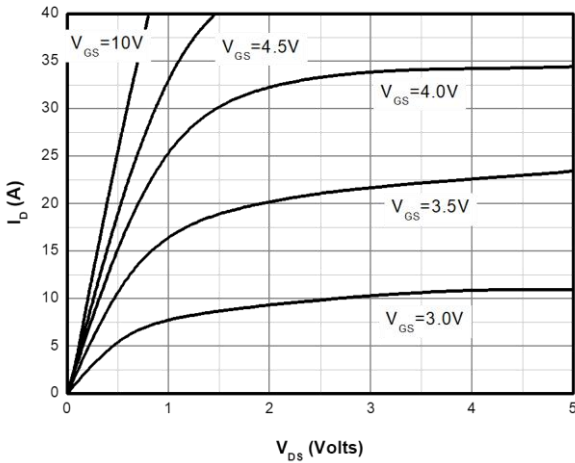


Fig 1: On-Region Characteristics

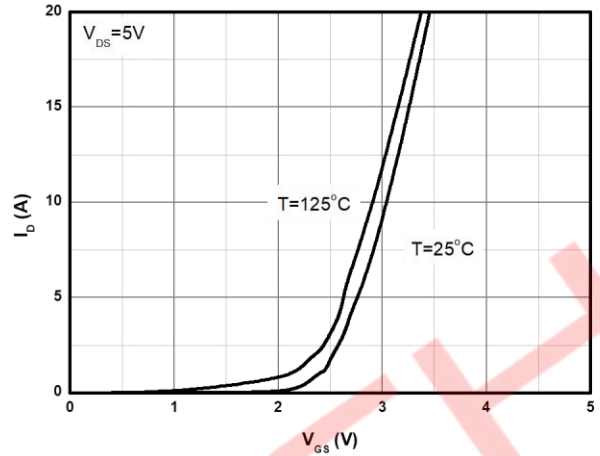


Figure 2: Transfer Characteristics

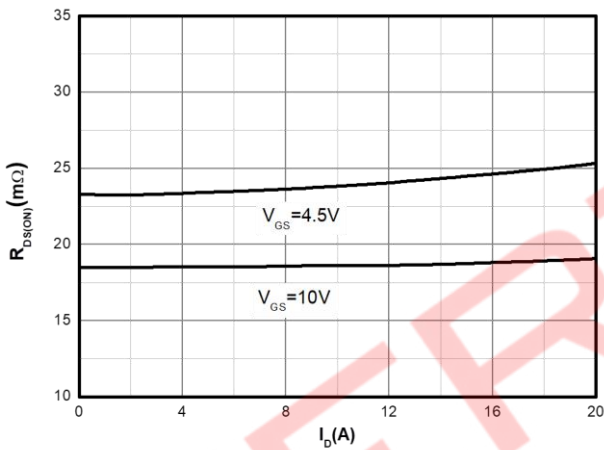


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

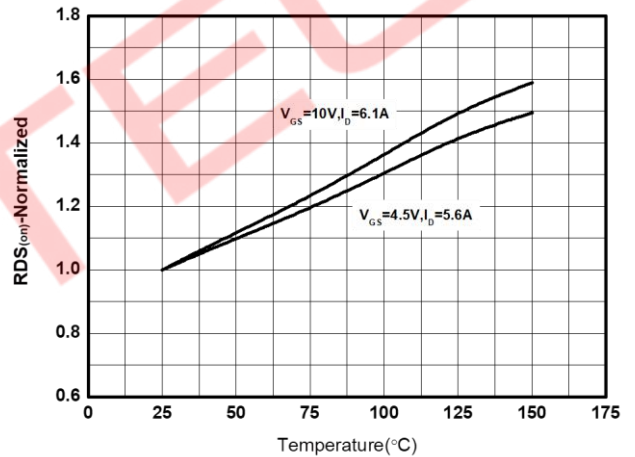


Figure 4: On-Resistance vs. Junction Temperature

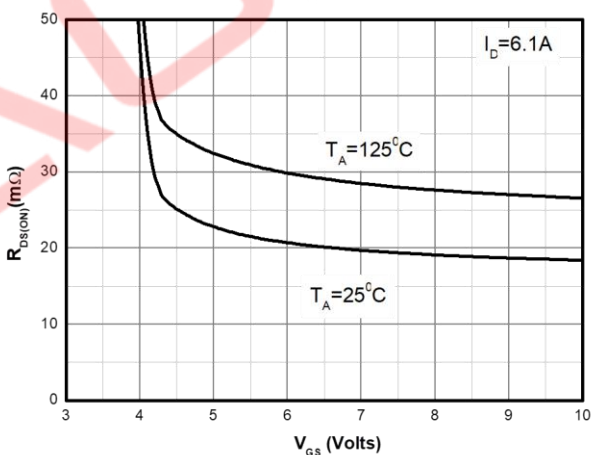


Figure 5: On-Resistance vs Gate-Source

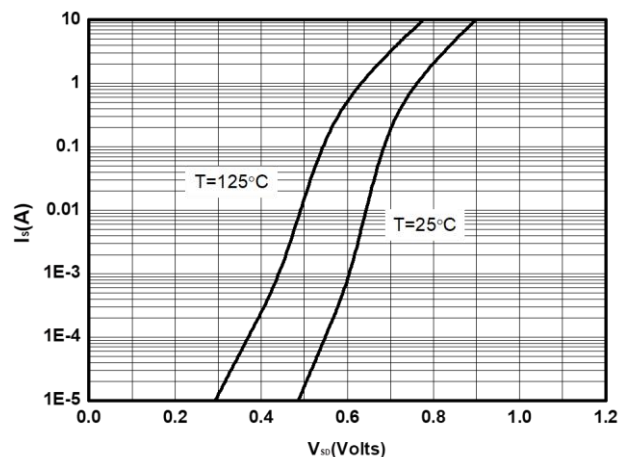


Figure 6: Body-Diode Characteristics

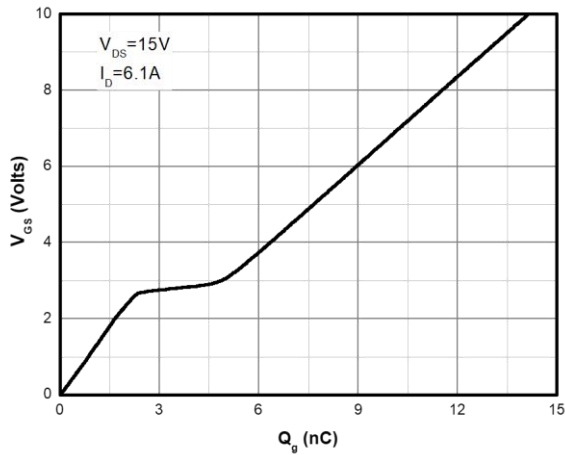


Figure 7: Gate-Charge Characteristics

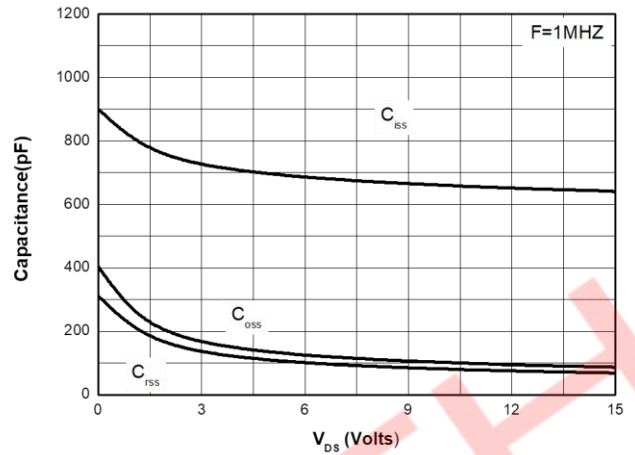


Figure 8: Capacitance Characteristics

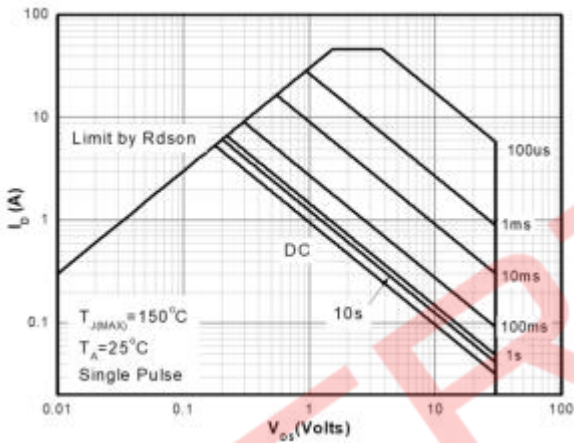


Figure 9: Maximum Forward Biased Safe Operating Area (Note 2)

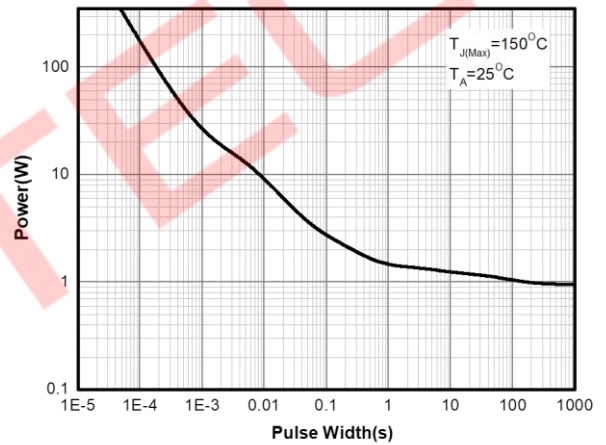


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note 2)

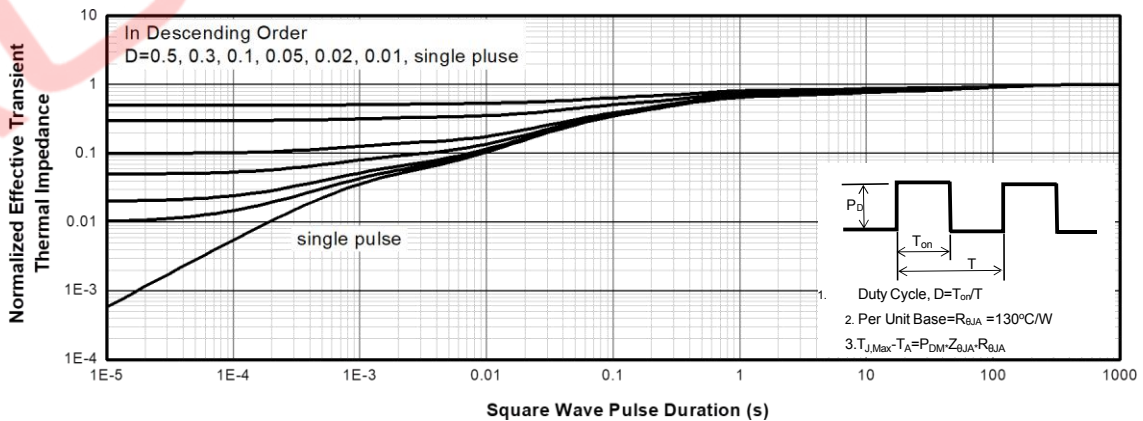
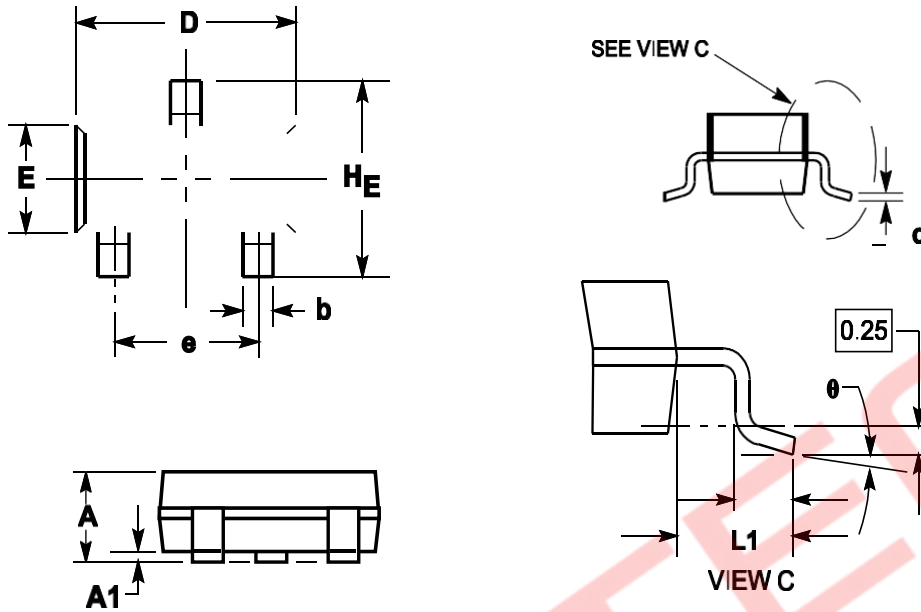


Figure 11: Normalized Maximum Transient Thermal Impedance (Note 2)

ATM6402NSA

Package Outline Dimension (Units: mm)

SOT-23



Symbol	Dimensions in millimeter		
	Min.	Typ.	Max.
A	0.900	1.025	1.150
A1	0.000	0.050	0.100
b	0.300	0.400	0.500
c	0.080	0.115	0.150
D	2.800	2.900	3.000
E	1.200	1.300	1.400
HE	2.250	2.400	2.550
e	1.800	1.900	2.000
L1	0.550REF		
L	0.300		0.500
θ	0°		8°

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