

# Single P-channel MOSFET

## ELM14423AA-N

### ■ General description

ELM14423AA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$ , low gate charge and low gate resistance. Internal ESD protection is included.

### ■ Features

- $V_{ds} = -30V$
- $I_d = -15A$  ( $V_{gs} = -20V$ )
- $R_{ds(on)} < 7m\Omega$  ( $V_{gs} = -20V$ )
- $R_{ds(on)} < 8.5m\Omega$  ( $V_{gs} = -10V$ )
- ESD Rating : 6000V HBM

### ■ Maximum absolute ratings

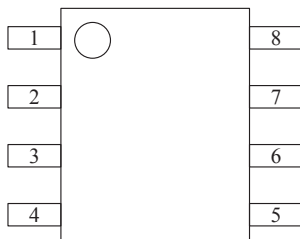
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	$V_{ds}$	-30	V		
Gate-source voltage	$V_{gs}$	$\pm 25$	V		
Continuous drain current	$I_d$	$T_a = 25^\circ C$	-15.0	A	1
		$T_a = 70^\circ C$	-12.1		
Pulsed drain current	$I_{dm}$	-80	A	2	
Power dissipation	$P_d$	$T_a = 25^\circ C$	3.1	W	1
		$T_a = 70^\circ C$	2.0		
Junction and storage temperature range	$T_j, T_{stg}$	-55 to 150	$^\circ C$		

### ■ Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 10s$	$R_{\theta ja}$	26	40	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		50	75	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R_{\theta jl}$	14	24	$^\circ C/W$	3

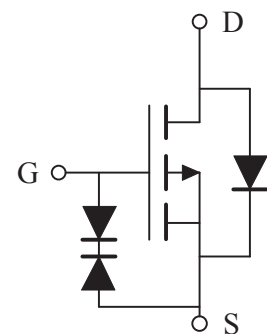
### ■ Pin configuration

SOP-8(TOP VIEW)



Pin No.	Pin name
1	SOURCE
2	SOURCE
3	SOURCE
4	GATE
5	DRAIN
6	DRAIN
7	DRAIN
8	DRAIN

### ■ Circuit



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### ■ Electrical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BV <sub>dss</sub>	I <sub>d</sub> =-250μA, V <sub>gs</sub> =0V	-30			V
Zero gate voltage drain current	I <sub>dss</sub>	V <sub>ds</sub> =-24V			-100	nA
		V <sub>gs</sub> =0V	T <sub>j</sub> =55°C		-500	
Gate-body leakage current	I <sub>gss</sub>	V <sub>ds</sub> =0V, V <sub>gs</sub> =±20V			±1	μA
		V <sub>ds</sub> =0V, V <sub>gs</sub> =±25V			±10	μA
Gate threshold voltage	V <sub>gs(th)</sub>	V <sub>ds</sub> =V <sub>gs</sub> , I <sub>d</sub> =-250μA	-2.0	-2.7	-3.5	V
On state drain current	I <sub>d(on)</sub>	V <sub>gs</sub> =-10V, V <sub>ds</sub> =-5V	-80			A
Static drain-source on-resistance	R <sub>ds(on)</sub>	V <sub>gs</sub> =-20V		5.7	7.0	mΩ
		I <sub>d</sub> =-15A	T <sub>j</sub> =125°C	7.1	8.6	
		V <sub>gs</sub> =-10V, I <sub>d</sub> =-15A		6.8	8.5	mΩ
		V <sub>gs</sub> =-6V, I <sub>d</sub> =-10A		9.4	12.0	mΩ
Forward transconductance	G <sub>fs</sub>	V <sub>ds</sub> =-5V, I <sub>d</sub> =-15A		43		S
Diode forward voltage	V <sub>sd</sub>	I <sub>s</sub> =-1A, V <sub>gs</sub> =0V		-0.71	-1.00	V
Max. body-diode continuous current	I <sub>s</sub>				-4.2	A
<b>DYNAMIC PARAMETERS</b>						
Input capacitance	C <sub>iss</sub>			4632		pF
Output capacitance	C <sub>oss</sub>	V <sub>gs</sub> =0V, V <sub>ds</sub> =-15V, f=1MHz		1034		pF
Reverse transfer capacitance	C <sub>rss</sub>			705		pF
Gate resistance	R <sub>g</sub>	V <sub>gs</sub> =0V, V <sub>ds</sub> =0V, f=1MHz		2.5		Ω
<b>SWITCHING PARAMETERS</b>						
Total gate charge	Q <sub>g</sub>	V <sub>gs</sub> =-10V, V <sub>ds</sub> =-15V		82.0		nC
Gate-source charge	Q <sub>gs</sub>	I <sub>d</sub> =-15A		16.8		nC
Gate-drain charge	Q <sub>gd</sub>			23.0		nC
Turn-on delay time	t <sub>d(on)</sub>			18.5		ns
Turn-on rise time	t <sub>r</sub>	V <sub>gs</sub> =-10V, V <sub>ds</sub> =-15V		20.0		ns
Turn-off delay time	t <sub>d(off)</sub>	R <sub>l</sub> =1Ω, R <sub>gen</sub> =3Ω		55.0		ns
Turn-off fall time	t <sub>f</sub>			30.0		ns
Body diode reverse recovery time	t <sub>rr</sub>	I <sub>f</sub> =-15A, dI/dt=100A/μs		43		ns
Body diode reverse recovery charge	Q <sub>rr</sub>	I <sub>f</sub> =-15A, dI/dt=100A/μs		38		nC

#### NOTE :

1. The value of R<sub>θja</sub> is measured with the device mounted on 1in<sup>2</sup> FR-4 board of 2oz. Copper, in still air environment with Ta=25°C. The value in any given applications 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<sub>θja</sub> is the sum of the thermal impedance from junction to lead R<sub>θjl</sub> and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in<sup>2</sup> FR-4 board with 2oz. Copper, in a still air environment with Ta=25°C. The SOA curve provides a single pulse rating.

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## ■ Typical electrical and thermal characteristics

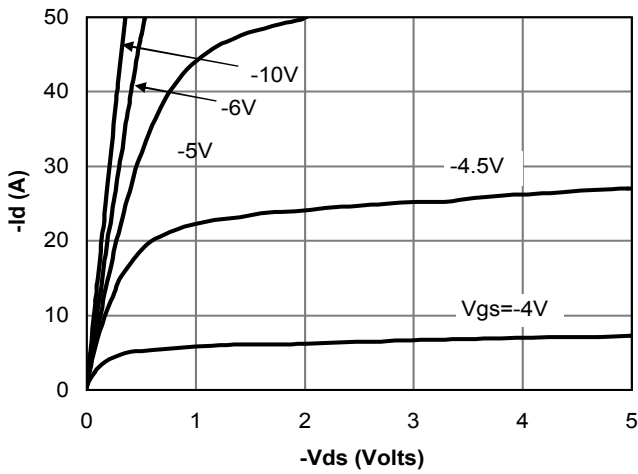


Fig 1: On-Region Characteristics

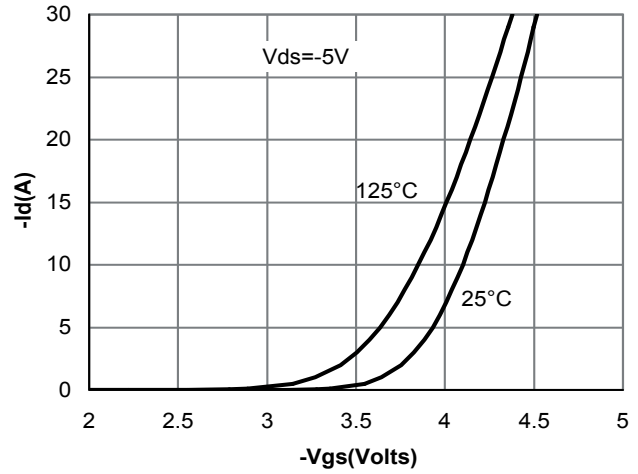


Figure 2: Transfer Characteristics

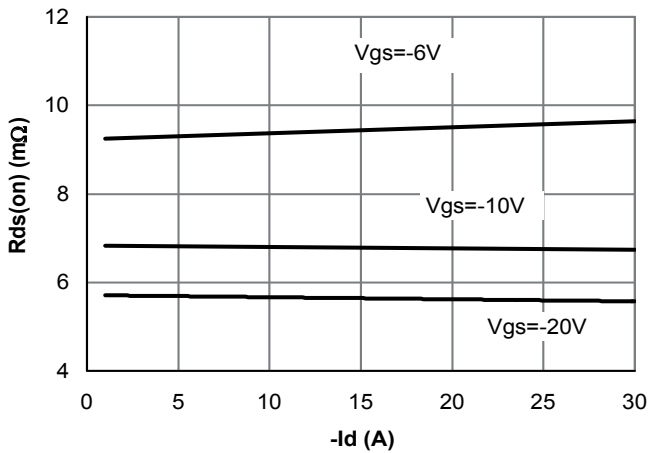


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

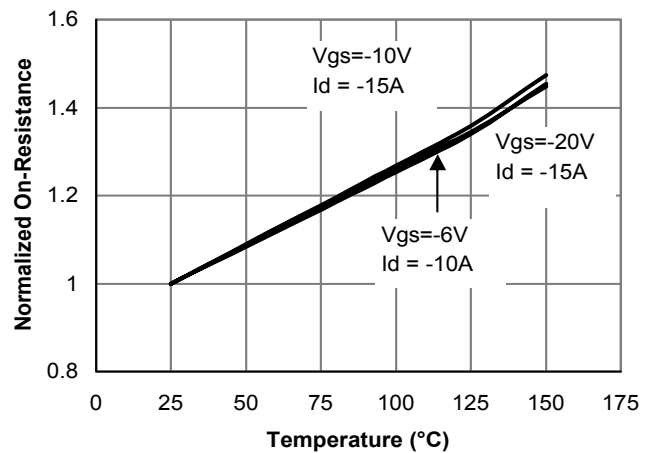


Figure 4: On-Resistance vs. Junction Temperature

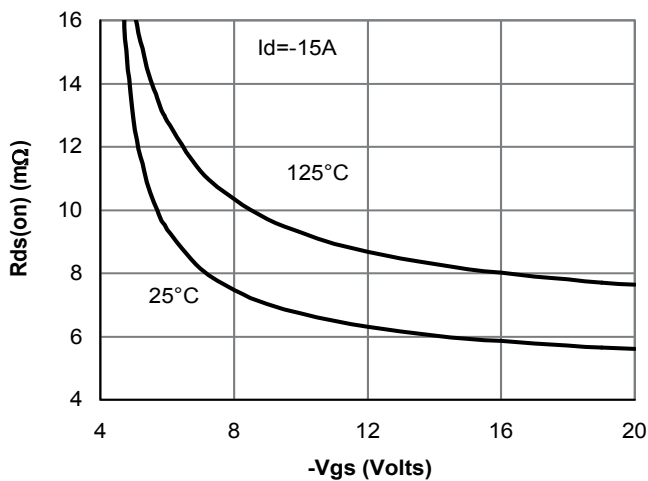


Figure 5: On-Resistance vs. Gate-Source Voltage

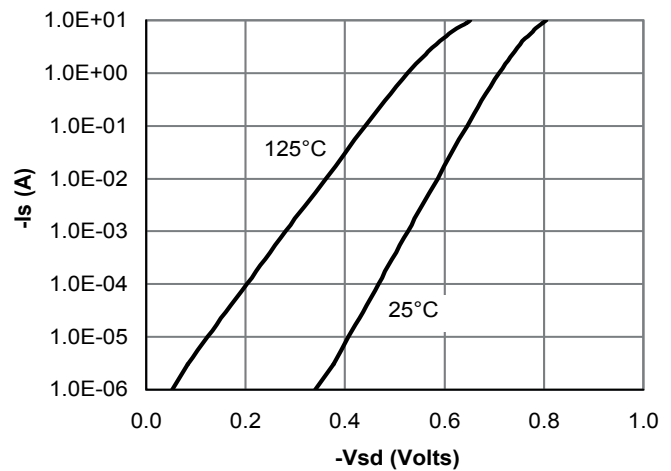


Figure 6: Body-Diode Characteristics

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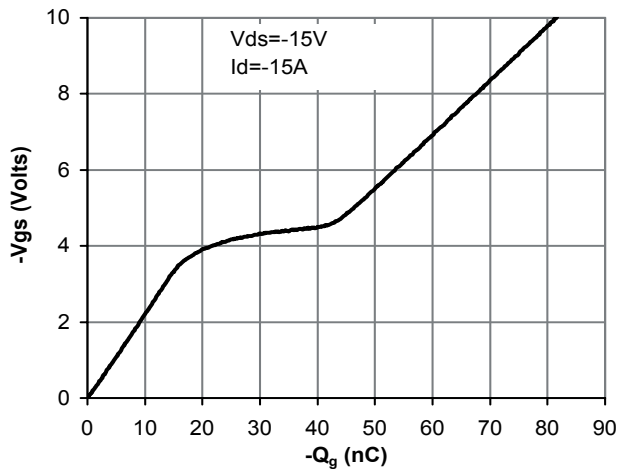


Figure 7: Gate-Charge Characteristics

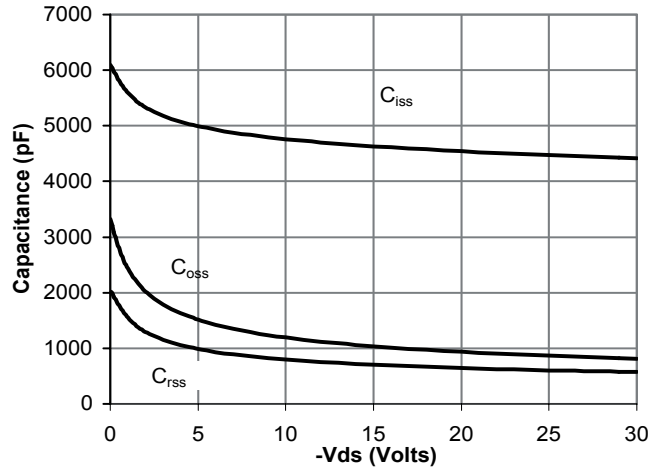


Figure 8: Capacitance Characteristics

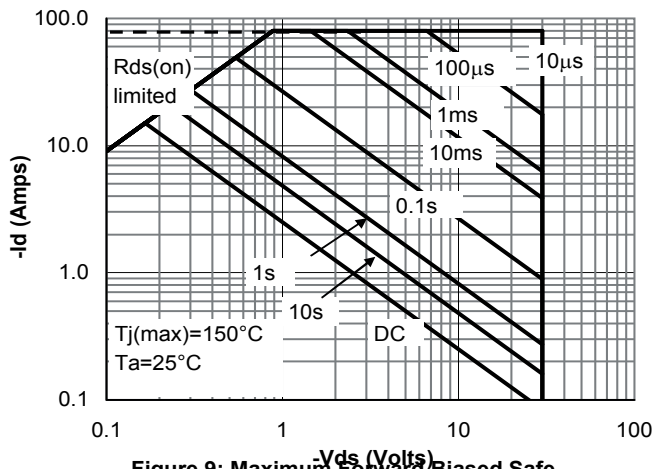


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

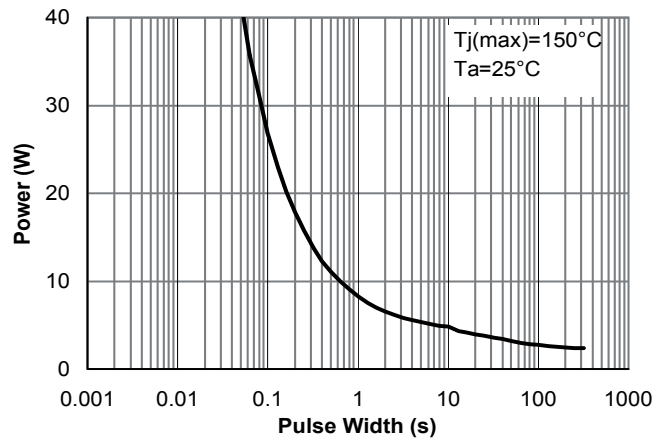


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

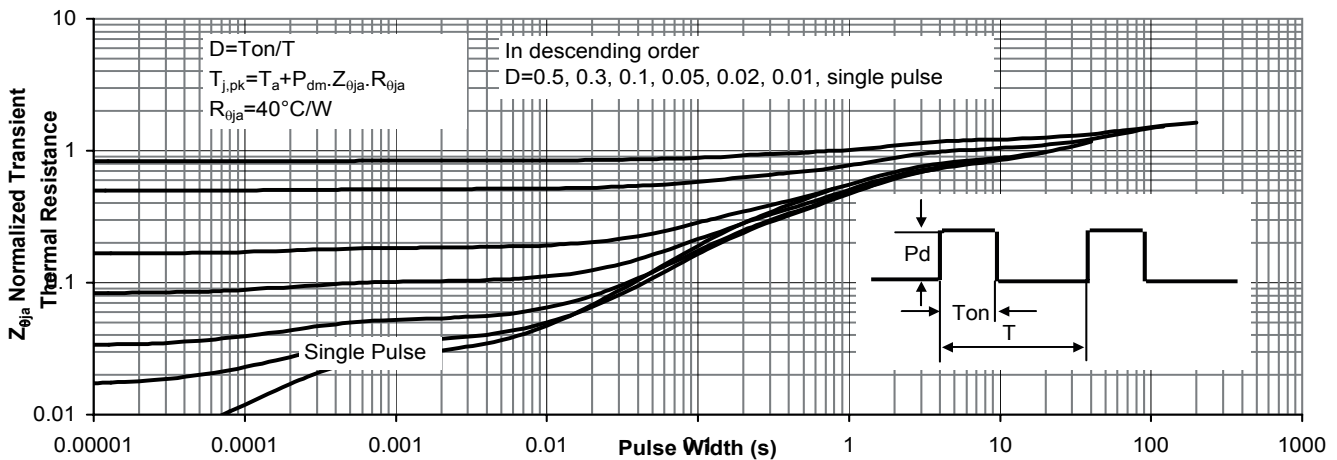


Figure 11: Normalized Maximum Transient Thermal Impedance