

Single N-channel MOSFET

ELM16404EA-S

■ General description

ELM16404EA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and operation with gate voltages as low as 1.8V and internal ESD protection is included.

■ Features

- $V_{ds}=20V$
- $I_d=8.6A$ ($V_{gs}=10V$)
- $R_{ds(on)} < 17m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} < 18m\Omega$ ($V_{gs}=4.5V$)
- $R_{ds(on)} < 24m\Omega$ ($V_{gs}=2.5V$)
- $R_{ds(on)} < 33m\Omega$ ($V_{gs}=1.8V$)
- ESD Rating : 2000V HBM

■ Maximum absolute ratings

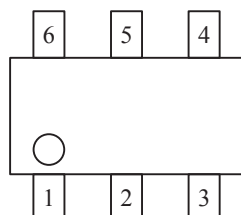
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	20	V		
Gate-source voltage	V_{gs}	± 12	V		
Continuous drain current	I_d	$T_a=25^\circ C$	8.6	A	1
		$T_a=70^\circ C$	6.8		
Pulsed drain current	I_{dm}	30	A	2	
Power dissipation	P_d	$T_a=25^\circ C$	2.00	W	1
		$T_a=70^\circ C$	1.28		
Junction 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	$t \leq 10s$	$R_{\theta ja}$	45.0	62.5	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		70.0	110.0	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R_{\theta jl}$	33.0	50.0	$^\circ C/W$	3

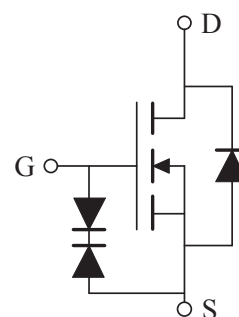
■ Pin configuration

SOT-26(TOP VIEW)



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

■ Circuit



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■ Electrical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	
STATIC PARAMETERS							
Drain-source breakdown voltage	BV _{dss}	I _d =250μA, V _{gs} =0V	20			V	
Zero gate voltage drain current	I _{dss}	V _{ds} =16V, V _{gs} =0V T _j =55°C			10	μA	
					25		
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±10V			10	μA	
Gate-source breakdown voltage	BV _{gso}	V _{ds} =0V, I _g =±250μA	±12			V	
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250μA	0.50	0.75	1.00	V	
On state drain current	I _{d(on)}	V _{gs} =4.5V, V _{ds} =5V	30			A	
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V, I _d =8.5A T _j =125°C		13.4	17.0	mΩ	
				16.0	20.0		
		V _{gs} =4.5V, I _d =5A			14.8	18.0	mΩ
		V _{gs} =2.5V, I _d =4A			18.8	24.0	mΩ
V _{gs} =1.8V, I _d =3A			25.5	33.0	mΩ		
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =8A		36		S	
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.73	1.00	V	
Max. body-diode continuous current	I _s				2.9	A	
DYNAMIC PARAMETERS							
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =10V, f=1MHz		1810		pF	
Output capacitance	C _{oss}			232		pF	
Reverse transfer capacitance	C _{rss}			200		pF	
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		1.6		Ω	
SWITCHING PARAMETERS							
Total gate charge	Q _g	V _{gs} =4.5V, V _{ds} =10V, I _d =8.5A		17.9		nC	
Gate-source charge	Q _{gs}			1.5		nC	
Gate-drain charge	Q _{gd}			4.7		nC	
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =10V R _l =1.2Ω, R _{gen} =3Ω		2.5		ns	
Turn-on rise time	t _r			7.2		ns	
Turn-off delay time	t _{d(off)}			49.0		ns	
Turn-off fall time	t _f			10.8		ns	
Body diode reverse recovery time	t _{rr}	I _f =8.5A, dI/dt=100A/μs		22.0		ns	
Body diode reverse recovery charge	Q _{rr}	I _f =8.5A, dI/dt=100A/μs		9.8		nC	

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² 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_{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 80μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in² 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

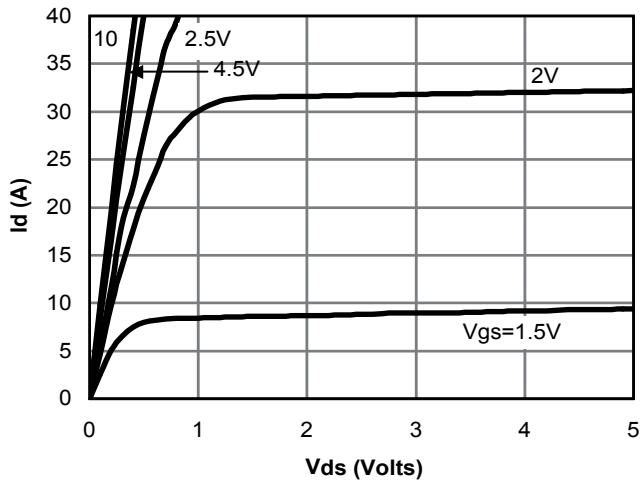


Fig 1: On-Region Characteristics

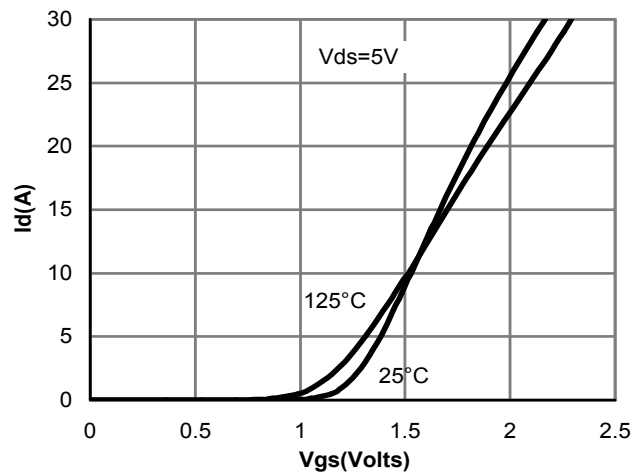


Figure 2: Transfer Characteristics

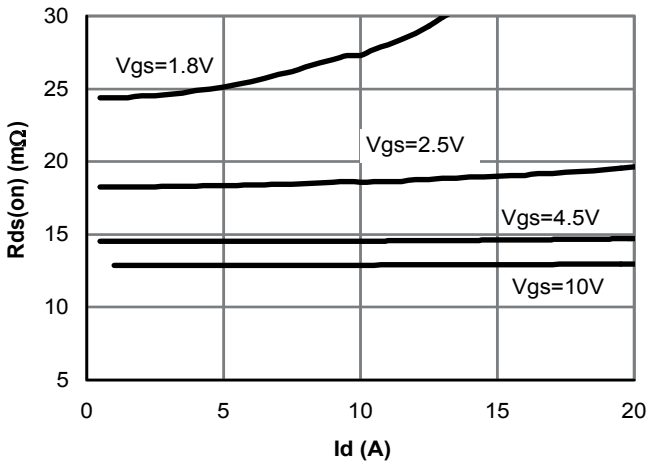


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

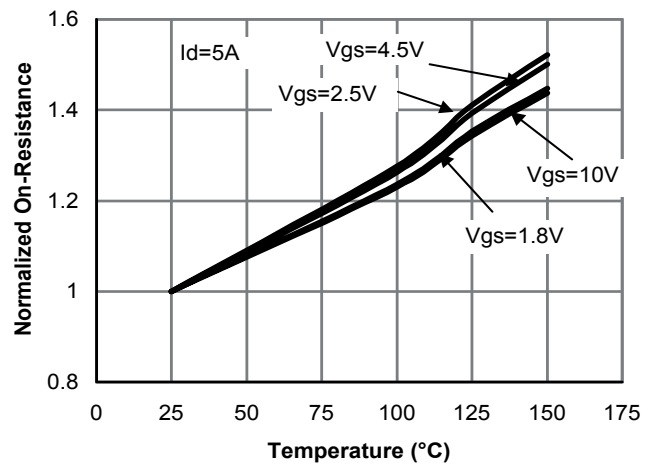


Figure 4: On-Resistance vs. Junction Temperature

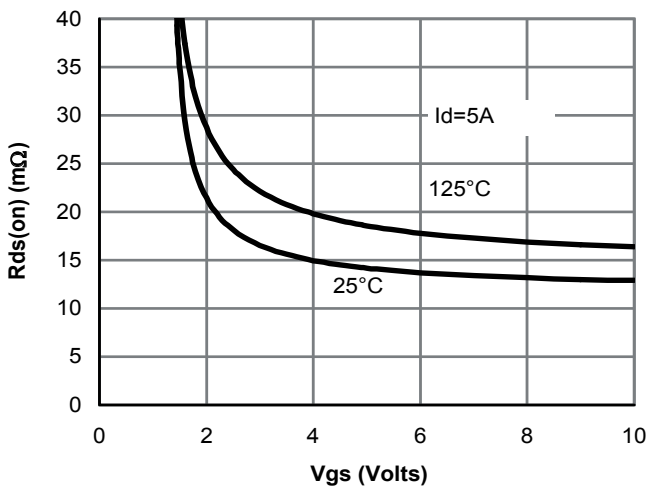


Figure 5: On-Resistance vs. Gate-Source Voltage

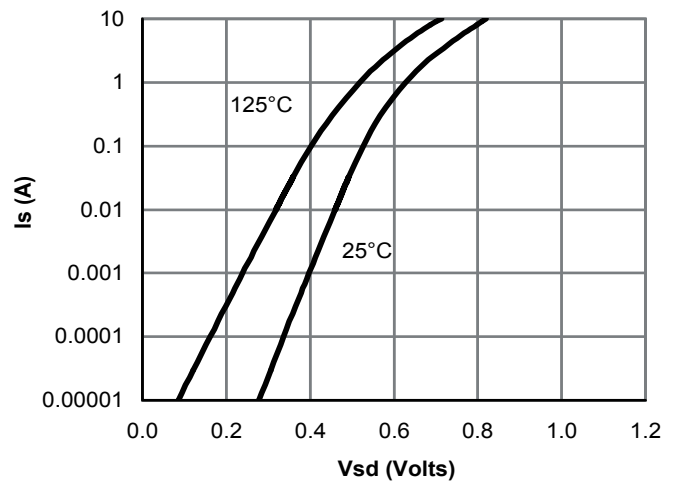


Figure 6: Body-Diode Characteristics

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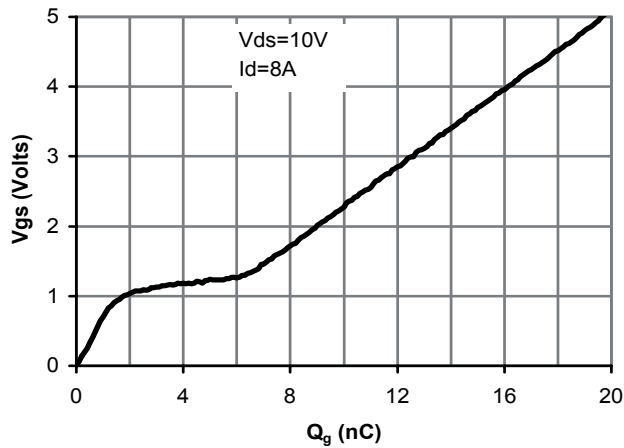


Figure 7: Gate-Charge Characteristics

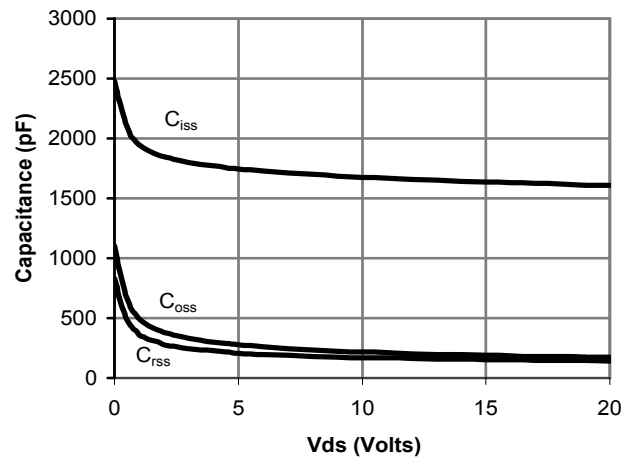


Figure 8: Capacitance Characteristics

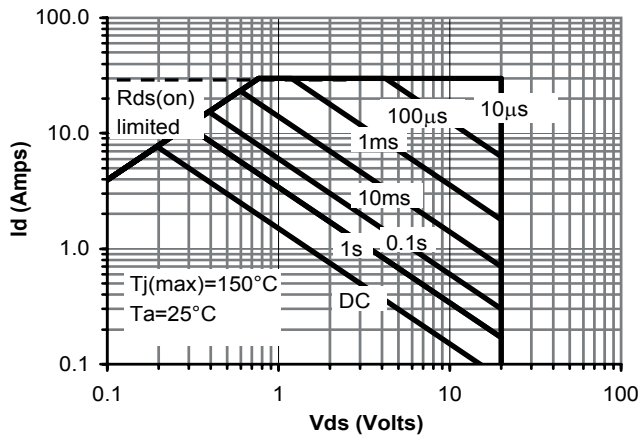


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

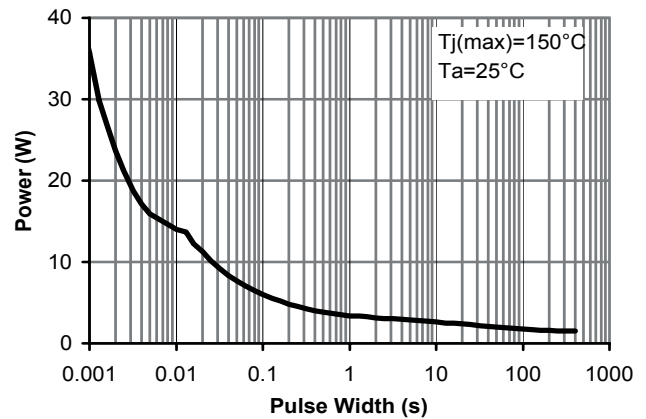


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

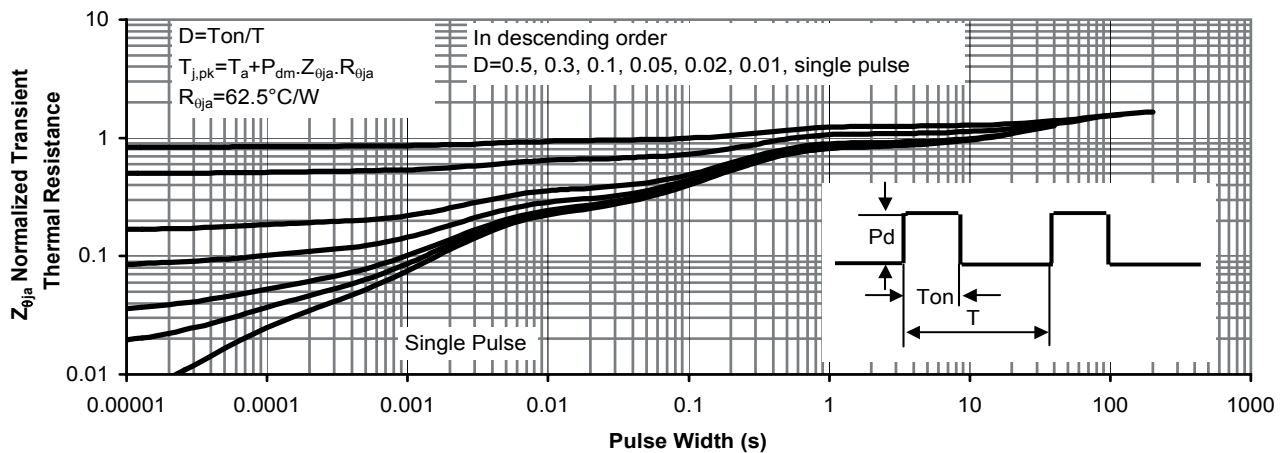


Figure 11: Normalized Maximum Transient Thermal Impedance