

Single N-channel MOSFET with schottky diode

ELM16706EA-S

General description

ELM16706EA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- $V_{ds}=30V$
 - $I_d=3.3A$ ($V_{gs}=10V$)
 - $R_{ds(on)} < 65m\Omega$ ($V_{gs}=10V$)
 - $R_{ds(on)} < 75m\Omega$ ($V_{gs}=4.5V$)
 - $R_{ds(on)} < 160m\Omega$ ($V_{gs}=2.5V$)
- Schottky diode
- $V_{ds(V)}=20V$
 - $I_f=1A$
 - $V_f < 0.5V@0.5A$

Maximum absolute ratings

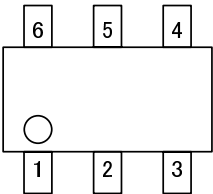
Parameter		Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage		V_{ds}	30		V	
Gate-source voltage		V_{gs}	± 12		V	
Continuous drain current	$T_a=25^{\circ}C$	I_d	3.3		A	1
	$T_a=70^{\circ}C$		2.6			
Pulsed drain current		I_{dm}	10		A	2
Schottky reverse voltage		V_{ka}		20	V	
Continuous forward current	$T_a=25^{\circ}C$	I_f		2	A	1
	$T_a=70^{\circ}C$			1		
Pulsed forward current		I_{fm}		10	A	2
Power dissipation	$T_a=25^{\circ}C$	P_d	1.15	0.92	W	
	$T_a=70^{\circ}C$		0.70	0.59		
Junction and storage temperature range		T_j, T_{stg}	-55 to 150	-55 to 150	$^{\circ}C$	

Thermal characteristics

Parameter (MOSFET)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 10s$	$R\theta_{ja}$	80.3	110.0	$^{\circ}C/W$	1
Maximum junction-to-ambient	Steady-state		117.0	150.0	$^{\circ}C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	43.0	80.0	$^{\circ}C/W$	3
Parameter (Schottky)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 10s$	$R\theta_{ja}$	109.4	135.0	$^{\circ}C/W$	1
Maximum junction-to-ambient	Steady-state		136.5	175.0	$^{\circ}C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	58.5	80.0	$^{\circ}C/W$	3

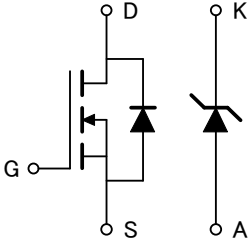
Pin configuration

SOT-26 (TOP VIEW)



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

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 =250 μ A, V _{gs} =0V	30			V
Zero gate voltage drain current	I _{dss}	V _{ds} =24V V _{gs} =0V			1	μ A
		T _j =55°C			5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} = $\pm$ 12V			100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μ A	1.0	1.4	1.8	V
On state drain current	I _{d(on)}	V _{gs} =4.5V, V _{ds} =5V	10			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V I _d =3.3A		44	65	m Ω
		T _j =125°C		64	90	
		V _{gs} =4.5V, I _d =3.0A		53	75	m Ω
		V _{gs} =2.5V, I _d =1A		106	160	m Ω
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =3.3A		11.7		S
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.81	1.00	V
Max. body-diode continuous current	I _s				2.5	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =15V, f=1MHz		226	270	pF
Output capacitance	C _{oss}			39		pF
Reverse transfer capacitance	C _{rss}			29		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		1.4	1.7	Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g	V _{gs} =4.5V, V _{ds} =15V, I _d =3.3A		3.00	3.60	nC
Gate-source charge	Q _{gs}			1.40		nC
Gate-drain charge	Q _{gd}			0.55		nC
Turn-on delay time	t _{d(on)}			2.6		ns
Turn-on rise time	t _r	V _{gs} =10V, V _{ds} =15V		3.2		ns
Turn-off delay time	t _{d(off)}	R _L =4.7 Ω , R _{gen} =6 Ω		14.5		ns
Turn-off fall time	t _f			2.1		ns
Body diode reverse recovery time	t _{rr}	I _f =3.3A, dI/dt=100A/ μ s		10.2	13.0	ns
Body diode reverse recovery charge	Q _{rr}	I _f =3.3A, dI/dt=100A/ μ s		3.8		nC
SCHOTTKY PARAMETERS						
Forward voltage drop	V _f	I _f =0.5A		0.39	0.50	V
Max. reverse leakage current	I _{rm}	V _r =16V			0.10	mA
		V _r =16V, T _j =125°C			20.00	
Junction capacitance	C _t	V _r =10V		34		pF
Schottky reverse recovery time	t _{rr}	I _f =1A, dI/dt=100A/ μ s		5.2	10.0	ns
Schottky reverse recovery charge	Q _{rr}	I _f =1A, dI/dt=100A/ μ s		0.8		nC

NOTE :

1. The value of R θ _{ja} 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 $\leq$ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R θ _{ja} is the sum of the thermal impedance from junction to lead R θ _{jl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80 μ s 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

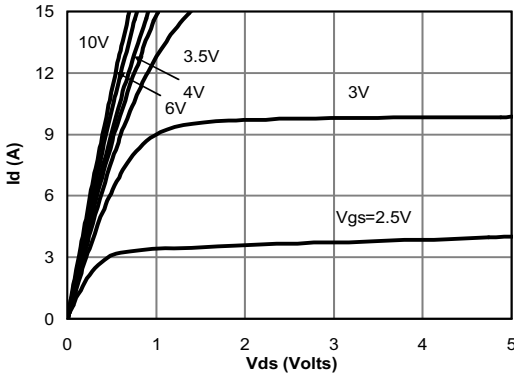


Fig 1: On-Region Characteristics

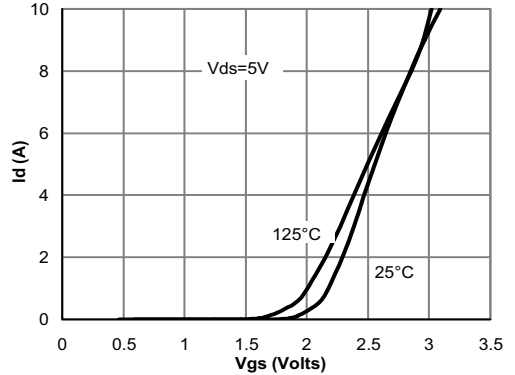


Figure 2: Transfer Characteristics

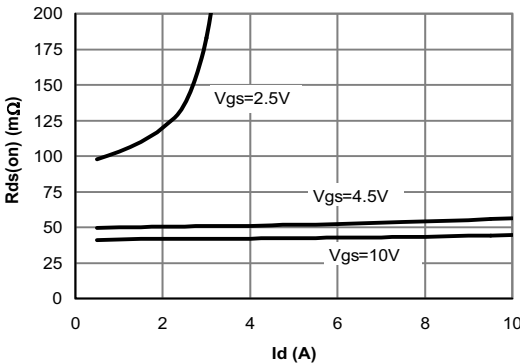


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

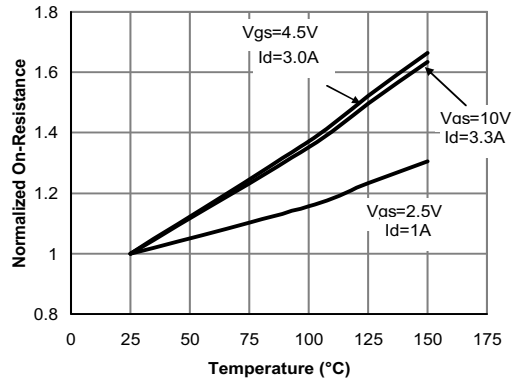


Figure 4: On-Resistance vs. Junction Temperature

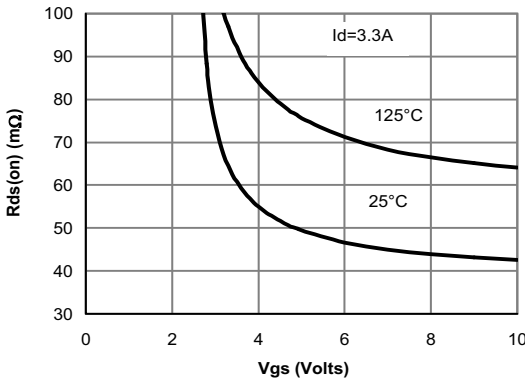


Figure 5: On-Resistance vs. Gate-Source Voltage

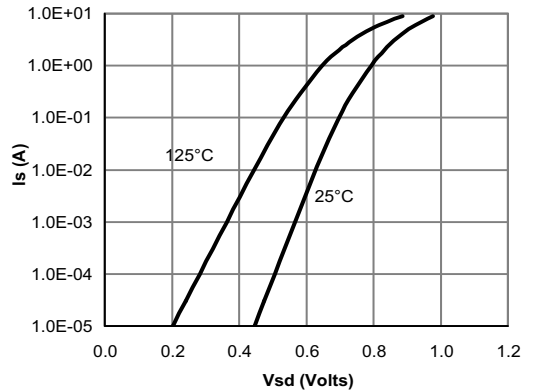


Figure 6: Body-Diode Characteristics

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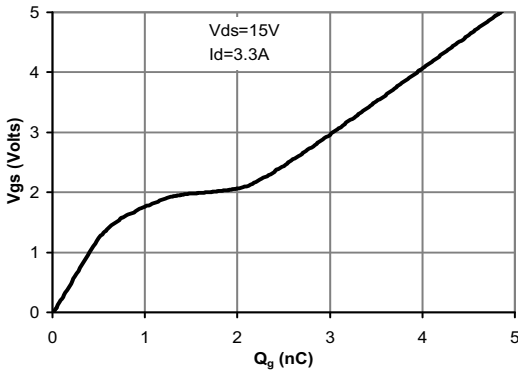


Figure 7: Gate-Charge Characteristics

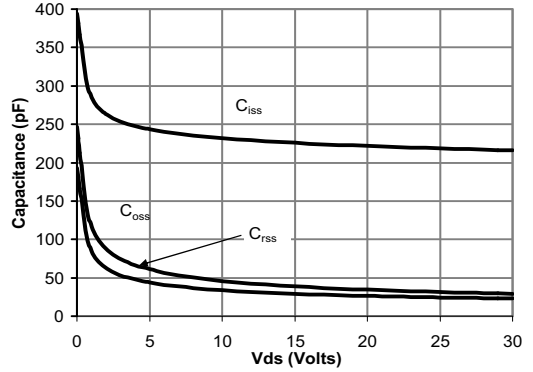


Figure 8: Capacitance Characteristics

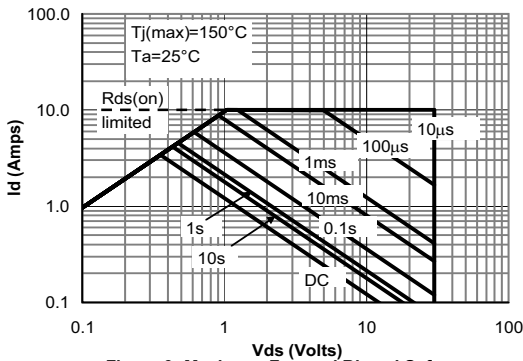


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

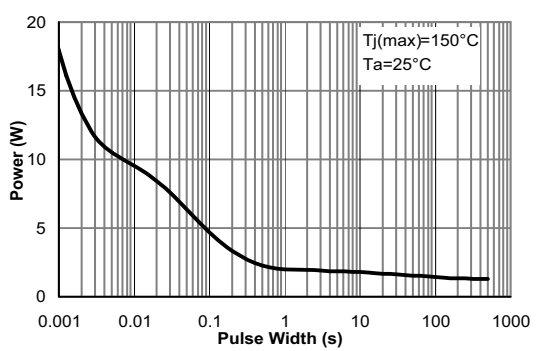


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

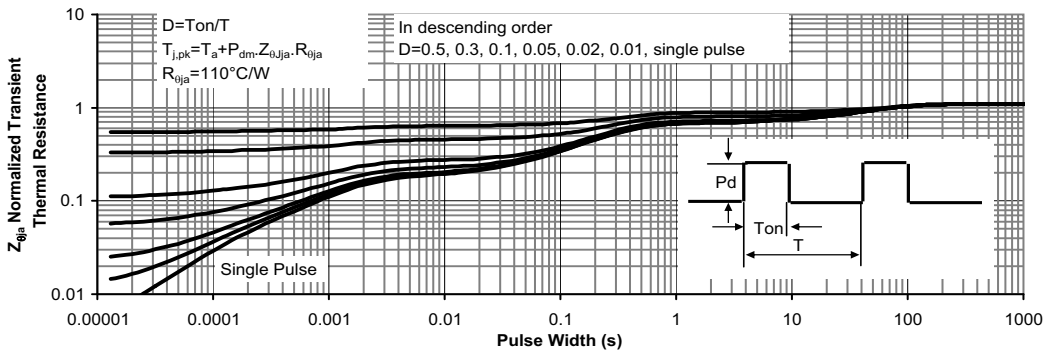


Figure 11: Normalized Maximum Transient Thermal Impedance

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Typical electrical and thermal characteristics (Schottky)

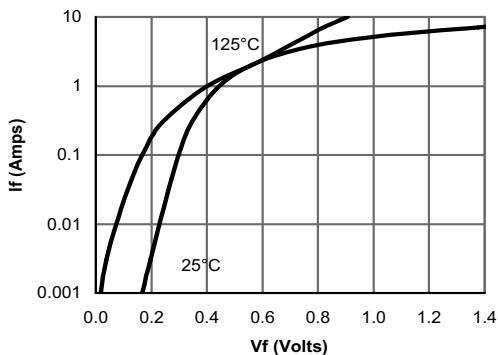


Figure 12: Schottky Forward Characteristics

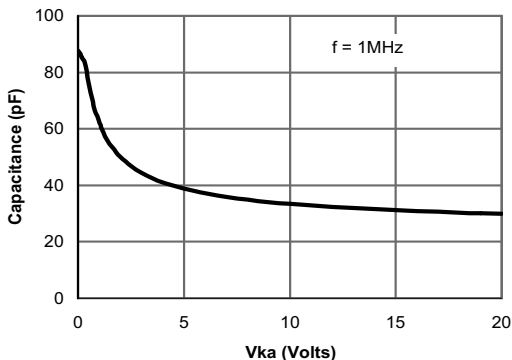


Figure 13: Schottky Capacitance Characteristics

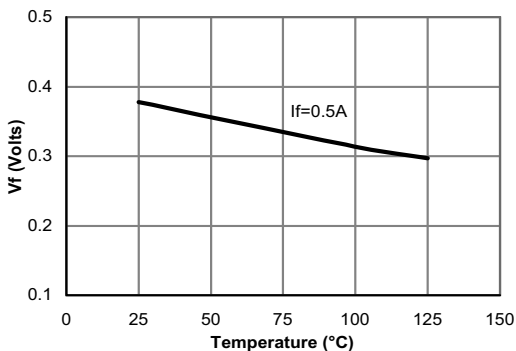


Figure 14: Schottky Forward Drop vs. Junction Temperature

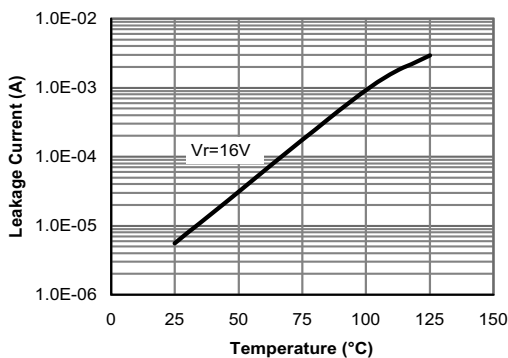


Figure 15: Schottky Leakage current vs. Junction Temperature

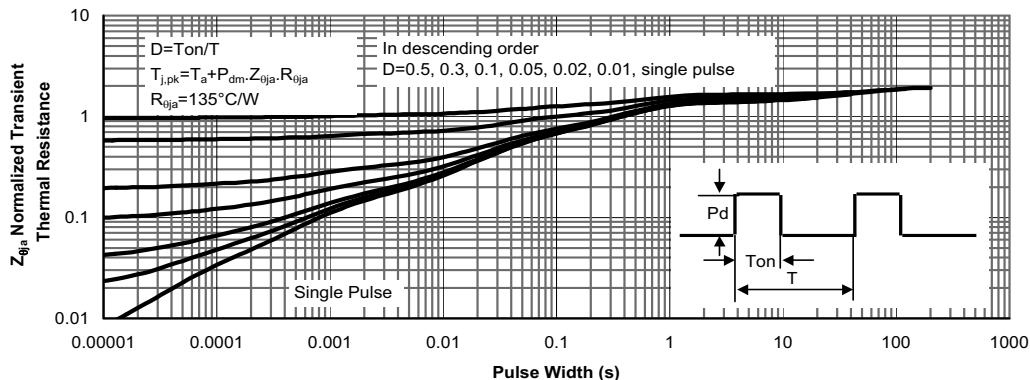


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance