

Single P-channel MOSFET with schottky diode

ELM16701EA-S

General description

ELM16701EA-S uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- $V_{ds} = -30V$
 - $I_d = -2.3A$ ($V_{gs} = -10V$)
 - $R_{ds(on)} < 135m\Omega$ ($V_{gs} = -10V$)
 - $R_{ds(on)} < 185m\Omega$ ($V_{gs} = -4.5V$)
 - $R_{ds(on)} < 265m\Omega$ ($V_{gs} = -2.5V$)
- Schottky diode
- $V_{ds(V)} = 20V$
 - $I_f = 1A$
 - $V_f < 0.5V @ 0.5A$

Maximum absolute ratings

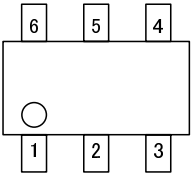
Parameter		Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage		V_{ds}	-30		V	
Gate-source voltage		V_{gs}	± 12		V	
Continuous drain current	$T_a = 25^\circ C$	I_d	-2.3		A	1
	$T_a = 70^\circ C$		-1.8			
Pulsed drain current		I_{dm}	-15		A	2
Schottky reverse voltage		V_{ka}		20	V	
Continuous forward 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	$t \leq 10s$	$R\theta_{ja}$	78	110	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		106	150	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	64	80	$^\circ C/W$	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

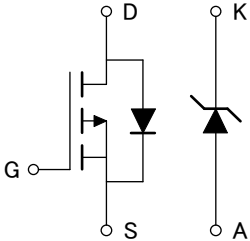
Pin configuration

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 μA, V _{gs} =0V	-30			V
Zero gate voltage drain current	I _{dss}	V _{ds} =-24V V _{gs} =0V			-1	μA
		T _j =55°C			-5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±12V			±100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =-250 μA	-0.6	-1.0	-1.4	V
On state drain current	I _{d(on)}	V _{gs} =-4.5V, V _{ds} =-5V	-15			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V I _d =-2.3A		107	135	mΩ
		T _j =125°C		154	190	
		V _{gs} =-4.5V, I _d =-2A		135	185	mΩ
		V _{gs} =-2.5V, I _d =-1A		195	265	mΩ
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-2.3A		8		S
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V		-0.85	-1.00	V
Max. body-diode continuous current	I _s				-1.35	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-15V, f=1MHz		409		pF
Output capacitance	C _{oss}			55		pF
Reverse transfer capacitance	C _{rss}			42		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		12		Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g	V _{gs} =-4.5V, V _{ds} =-15V I _d =-2A		4.9		nC
Gate-source charge	Q _{gs}			0.6		nC
Gate-drain charge	Q _{gd}			1.6		nC
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-15V R _L =7.5 Ω, R _{gen} =3 Ω		6.9		ns
Turn-on rise time	t _r			3.3		ns
Turn-off delay time	t _{d(off)}			38.5		ns
Turn-off fall time	t _f			13.2		ns
Body diode reverse recovery time	t _{rr}	I _f =-2A, dI/dt=100A/μs		15		ns
Body diode reverse recovery charge	Q _{rr}	I _f =-2A, dI/dt=100A/μs		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/μs		5.2	10.0	ns
Schottky reverse recovery charge	Q _{rr}	I _f =1A, dI/dt=100A/μs		0.8		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 6,12,14 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

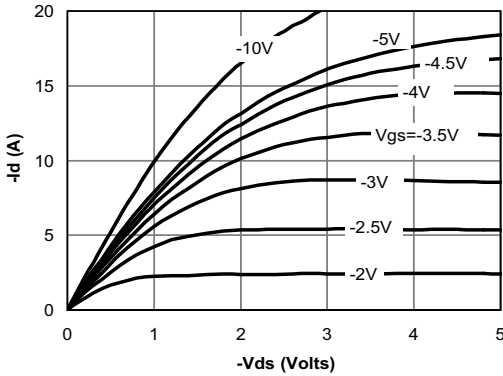


Fig 1: On-Region Characteristics

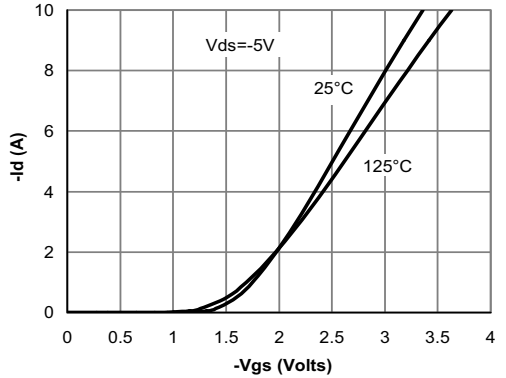


Figure 2: Transfer Characteristics

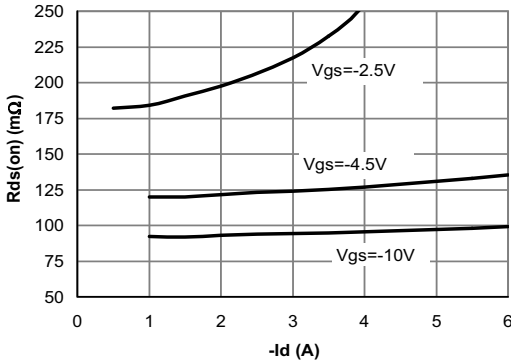


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

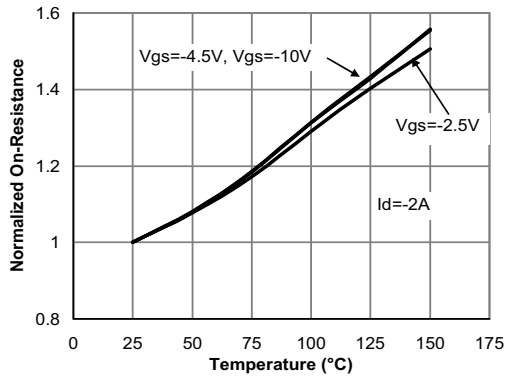


Figure 4: On-Resistance vs. Junction Temperature

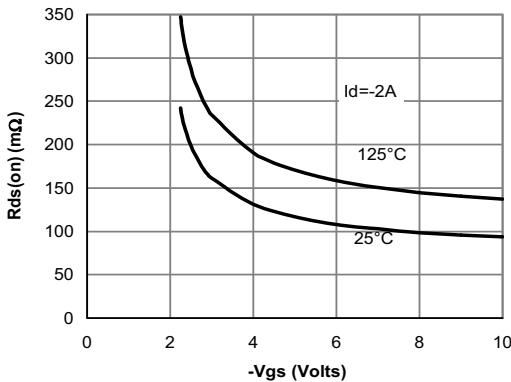


Figure 5: On-Resistance vs. Gate-Source Voltage

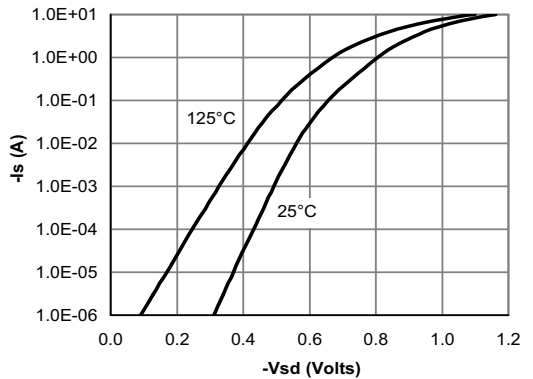


Figure 6: Body-Diode Characteristics

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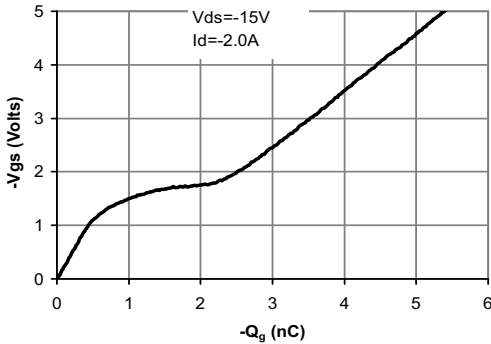


Figure 7: Gate-Charge Characteristics

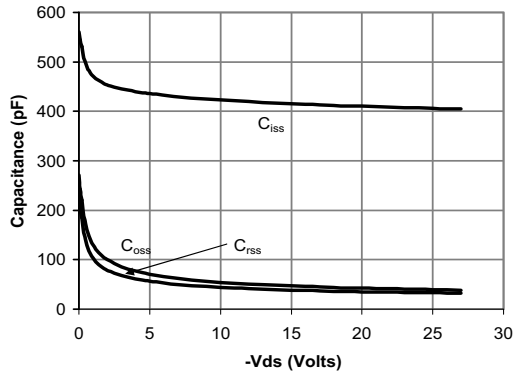


Figure 8: Capacitance Characteristics

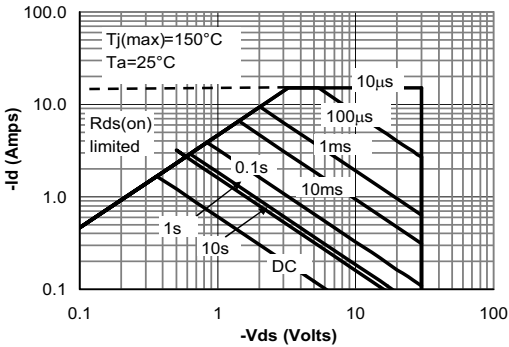


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

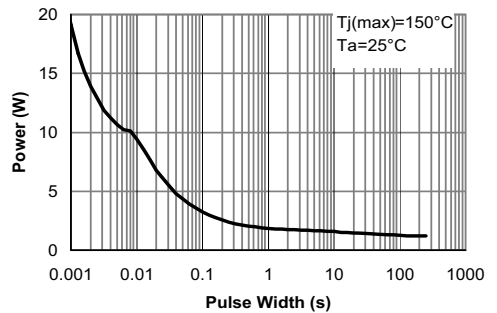


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

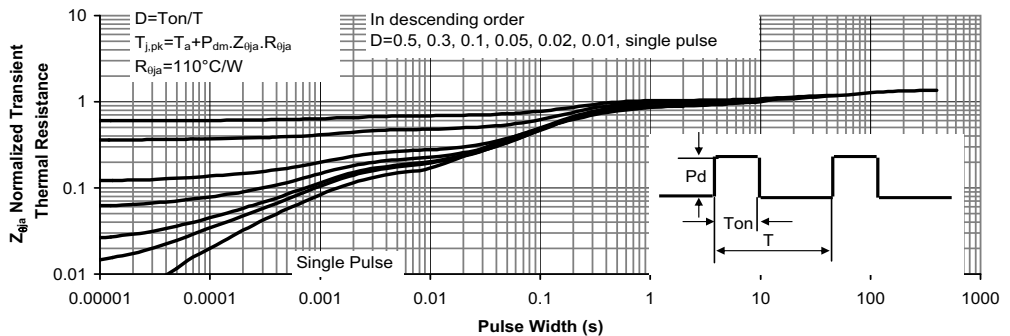


Figure 11: Normalized Maximum Transient Thermal Impedance

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Typical electrical and thermal characteristics (Schottky)

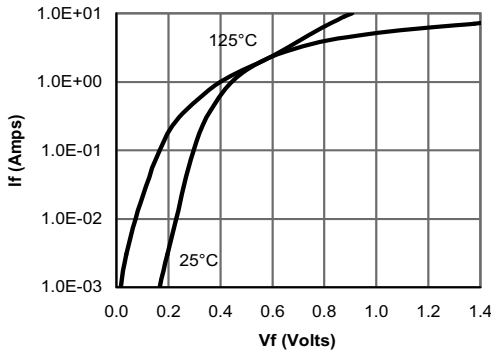


Figure 12: Schottky Forward Characteristics

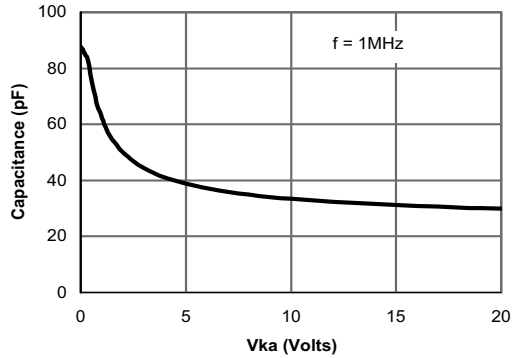


Figure 13: Schottky Capacitance Characteristics

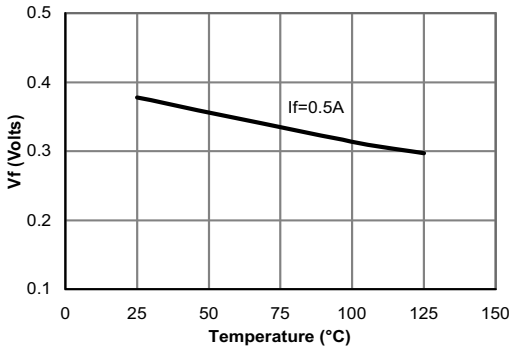


Figure 14: Schottky Forward Drop vs. Junction Temperature

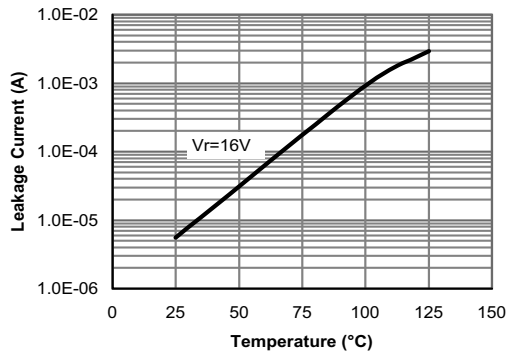


Figure 15: Schottky Leakage current vs. Junction Temperature

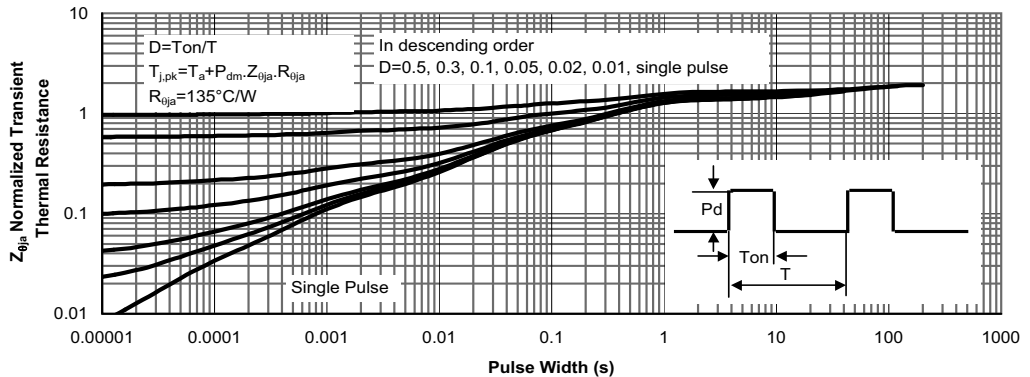


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance