

Single N-channel MOSFET with schottky diode

ELM14700AA-N

General description

ELM14700AA-N uses advanced trench technology to provide excellent $R_{ds(on)}$ and low gate charge.

Features

- $V_{ds}=30V$
 - $I_d=6.9A$ ($V_{gs}=10V$)
 - $R_{ds(on)} < 28m\Omega$ ($V_{gs}=10V$)
 - $R_{ds(on)} < 42m\Omega$ ($V_{gs}=4.5V$)
- Schottky diode
- $V_{ds}(V)=30V$
 - $I_f=4A$
 - $V_f < 0.5V@3A$

Maximum absolute ratings

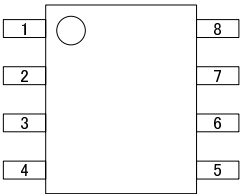
Parameter		Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage		V_{ds}	30		V	
Gate-source voltage		V_{gs}	± 20		V	
Continuous drain current	$T_a=25^{\circ}C$	I_d	6.9		A	1
	$T_a=70^{\circ}C$		5.8			
Pulsed drain current		I_{dm}	30		A	2
Schottky reverse voltage		V_{ka}		30	V	
Continuous forward current	$T_a=25^{\circ}C$	I_f		4.0	A	1
	$T_a=70^{\circ}C$			2.6		
Pulsed forward current		I_{fm}		40	A	2
Power dissipation	$T_a=25^{\circ}C$	P_d	2.00	2.00	W	
	$T_a=70^{\circ}C$		1.28	1.28		
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	$t \leq 10s$	$R\theta_{ja}$	48.0	62.5	$^{\circ}C/W$	1
Maximum junction-to-ambient	Steady-state		74.0	110.0	$^{\circ}C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	35.0	40.0	$^{\circ}C/W$	3
Parameter (Schottky)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 10s$	$R\theta_{ja}$	44.0	62.5	$^{\circ}C/W$	1
Maximum junction-to-ambient	Steady-state		73.0	110.0	$^{\circ}C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	31.0	40.0	$^{\circ}C/W$	3

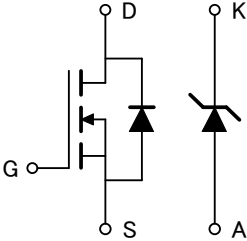
Pin configuration

SOP-8 (TOP VIEW)



Pin No.	Pin name
1	ANODE
2	ANODE
3	SOURCE
4	GATE
5	DRAIN
6	DRAIN
7	CATHODE
8	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} =±20V			100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μA	1.0	1.9	3.0	V
On state drain current	I _{d(on)}	V _{gs} =4.5V, V _{ds} =5V	20			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V I _d =6.9A		22.5	28.0	mΩ
		T _j =125°C		31.3	38.0	
		V _{gs} =4.5V, I _d =5A		34.5	42.0	mΩ
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =6.9A	10.0	15.4		S
Diode forward voltage	V _{sd}	I _s =1A		0.76	1.00	V
Max. body-diode continuous current	I _s				3	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =15V, f=1MHz		680		pF
Output capacitance	C _{oss}			102		pF
Reverse transfer capacitance	C _{rss}			77		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		3		Ω
SWITCHING PARAMETERS						
Total gate charge (10V)	Q _g	V _{gs} =10V, V _{ds} =15V, I _d =6.9A		13.84		nC
Total gate charge (4.5V)	Q _g			6.74		nC
Gate-source charge	Q _{gs}			1.82		nC
Gate-drain charge	Q _{gd}			3.20		nC
Turn-on delay time	t _{d(on)}	V _{gs} =10V, V _{ds} =15V R _L =2.2 Ω, R _{gen} =3 Ω		4.6		ns
Turn-on rise time	t _r			4.1		ns
Turn-off delay time	t _{d(off)}			20.6		ns
Turn-off fall time	t _f			5.2		ns
Body diode reverse recovery time	t _{rr}	I _f =6.9A, dI/dt=100A/μs		16.5		ns
Body diode reverse recovery charge	Q _{rr}	I _f =6.9A, dI/dt=100A/μs		7.8		nC
SCHOTTKY PARAMETERS						
Forward voltage drop	V _f	I _f =3A		0.45	0.50	V
Max. reverse leakage current	I _{rm}	V _r =24V		0.07	0.15	mA
		V _r =24V	T _j =125°C	4.20	20.00	
			T _j =150°C	15.00	60.00	
Junction capacitance	C _t	V _r =15V		120		pF

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

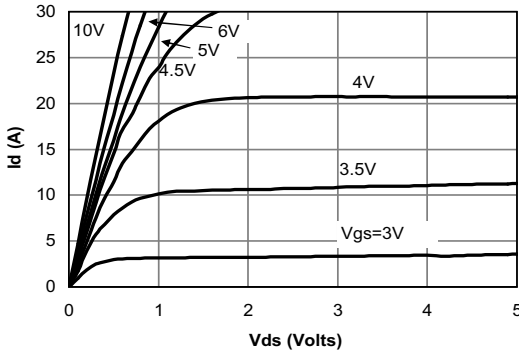


Fig 1: On-Region Characteristics

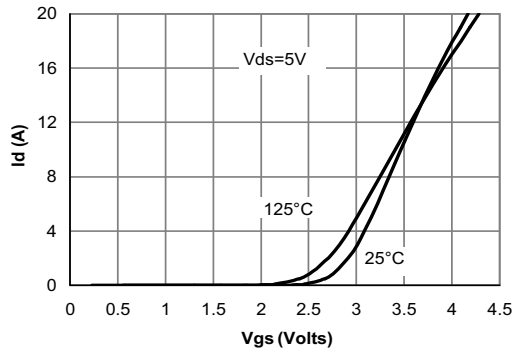


Figure 2: Transfer Characteristics

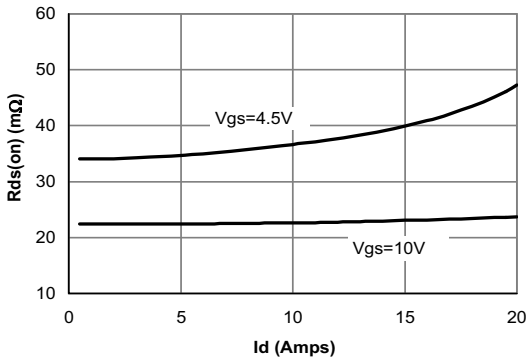


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

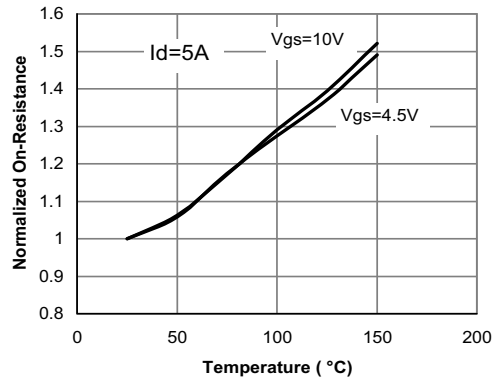


Figure 4: On-Resistance vs. Junction Temperature

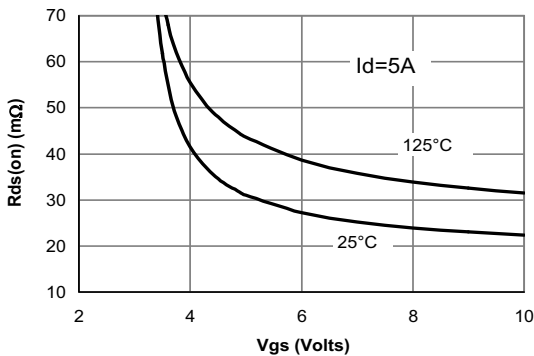


Figure 5: On-Resistance vs. Gate-Source Voltage

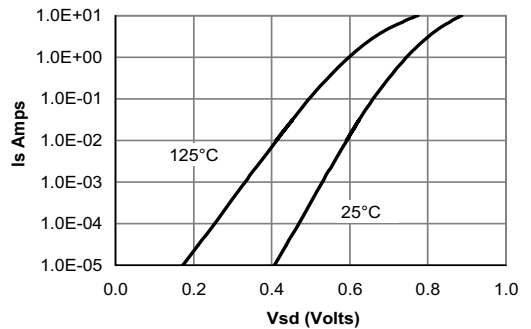


Figure 6: Body diode characteristics

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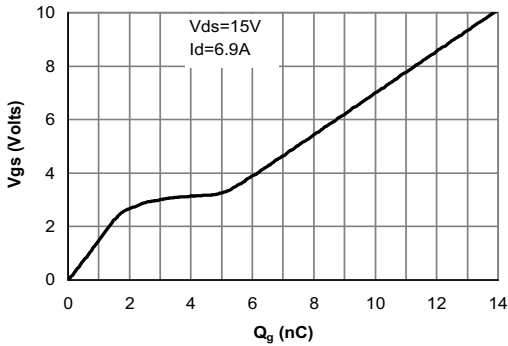


Figure 7: Gate-Charge Characteristics

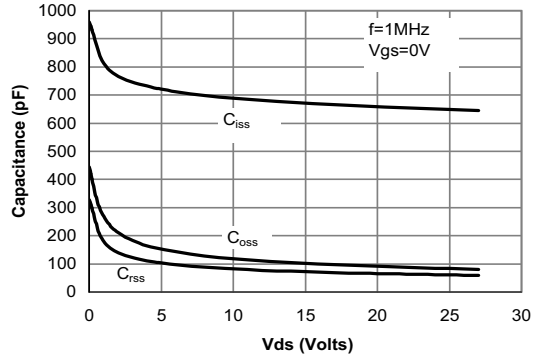


Figure 8: Capacitance Characteristics

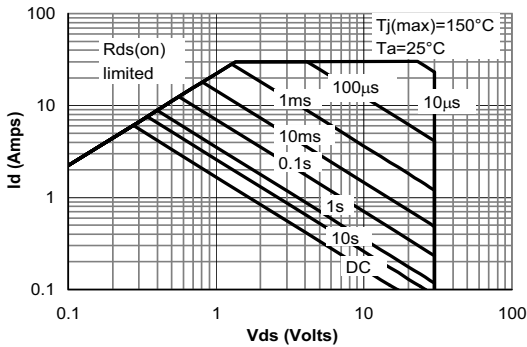


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

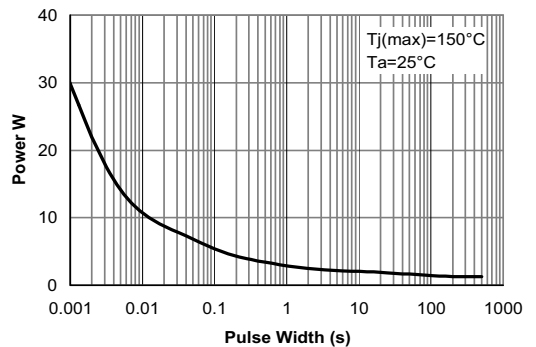


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

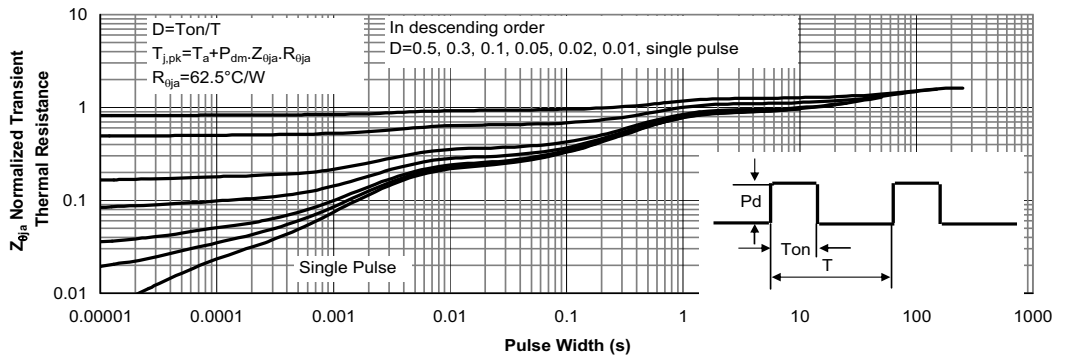


Figure 11: Normalized Maximum Transient Thermal Impedance

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Typical electrical and thermal characteristics (Schottky)

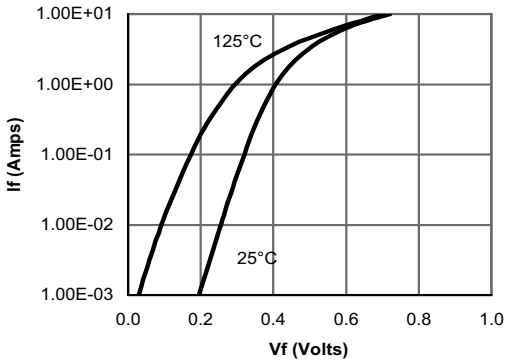


Figure 12: Schottky Forward Characteristics

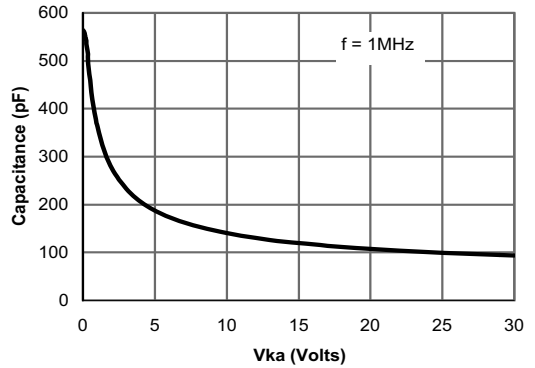


Figure 13: Schottky Capacitance Characteristics

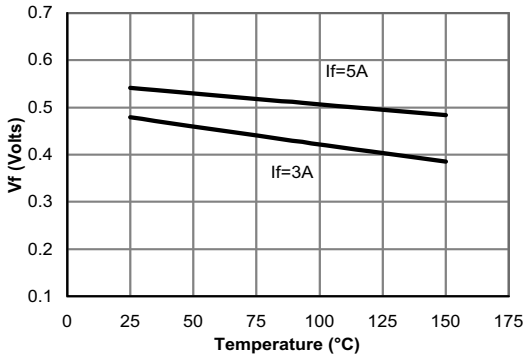


Figure 14: Schottky Forward Drop vs. Junction Temperature

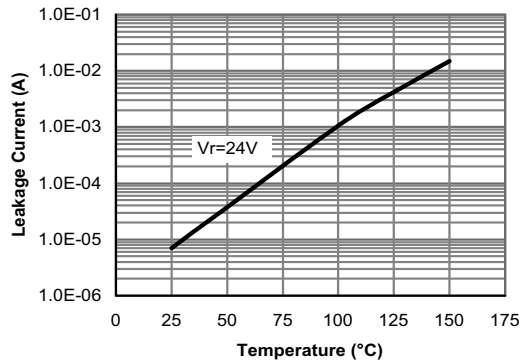


Figure 15: Schottky Leakage current vs. Junction Temperature

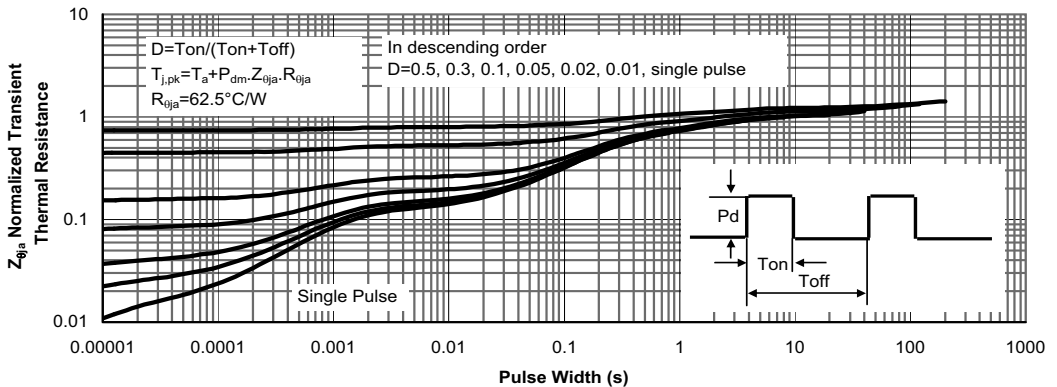


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance