Single N-channel MOSFET with schottky diode

ELM14702AA-N

■General description

ELM14702AA-N uses advanced trench technology to provide excellent Rds(on) and low gate charge.

■Features

- Vds=30V
- Id=11A
- Rds(on) < 16mΩ (Vgs=10V)
- Rds(on) < 25mΩ (Vgs=4.5V)

Schottky diode

- Vds(V)=30V
- If=3A
- Vf < 0.5V@1A

■Maximum absolute ratings

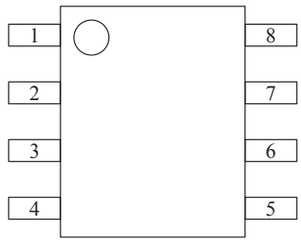
Parameter		Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage		Vds	30		V	
Gate-source voltage		Vgs	±20		V	
Continuous drain current	Ta=25°C	Id	11.0		A	1
	Ta=70°C		9.3			
Pulsed drain current		Idm	50		A	2
Schottky reverse voltage		Vka		30	V	
Continuous forward current	Ta=25°C	If		4.4	A	1
	Ta=70°C			3.2		
Pulsed diode forward current		Ifm		30	A	2
Power dissipation	Ta=25°C	Pd	3	3	W	
	Ta=70°C		2	2		
Junction and storage temperature range		Tj, Tstg	-55 to 150	-55 to 150	°C	

■Thermal characteristics

Parameter (MOSFET)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤10s	Rθja	31	40	°C/W	1
Maximum junction-to-ambient	Steady-state		59	75	°C/W	
Maximum junction-to-lead	Steady-state	Rθjl	16	24	°C/W	3
Parameter (Schottky)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤10s	Rθja	36	40	°C/W	1
Maximum junction-to-ambient	Steady-state		67	75	°C/W	
Maximum junction-to-lead	Steady-state	Rθjl	25	30	°C/W	3

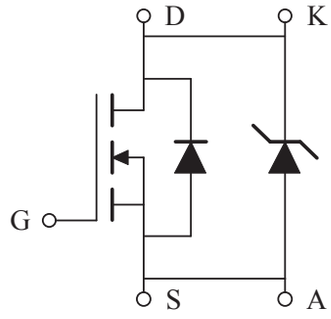
■Pin configuration

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



■Electrical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BVdss	Id=250μA, Vgs=0V	30			V
Zero gate voltage drain current (Set by schottky leakage)	Idss	Vr=30V		0.007	0.050	mA
		Vr=30V, Tj=125°C		3.200	10.000	
		Vr=30V, Tj=150°C		12.000	20.000	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V			100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA	1.0	1.8	3.0	V
On state drain current	Id(on)	Vgs=4.5V, Vds=5V	40			A
Static drain-source on-resistance	Rds(on)	Vgs=10V Id=11A		13.4	16.0	mΩ
		Vgs=10V Id=11A Tj=125°C		16.8	21.0	
		Vgs=4.5V, Id=8A		20.0	25.0	mΩ
Forward transconductance	Gfs	Vds=5V, Id=11A		25		S
Diode+schottky forward voltage	Vsd	Is=1A, Vgs=0V		0.45	0.50	V
Max. body-diode+schottky continuous current	Is				5	A
DYNAMIC PARAMETERS						
Input capacitance	Ciss	Vgs=0V, Vds=15V f=1MHz		1040	1250	pF
Output capacitance (FET+Schottky)	Coss			212		pF
Reverse transfer capacitance	Crss			121		pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz		0.70	0.85	Ω
SWITCHING PARAMETERS						
Total gate charge (10V)	Qg	Vgs=10V, Vds=15V Id=11A		19.8	24.0	nC
Total gate charge (4.5V)	Qg			9.8	12.0	nC
Gate-source charge	Qgs			2.5		nC
Gate-drain charge	Qgd			3.5		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=15V Rl=1.35Ω, Rgen=3Ω		4.5	7.0	ns
Turn-on rise time	tr			3.9	7.0	ns
Turn-off delay time	td(off)			17.4	30.0	ns
Turn-off fall time	tf			3.2	5.7	ns
Body diode+schottky reverse recovery time	trr	If=11A, dI/dt=100A/μs		19	23	ns
Body diode+schottky reverse recovery charge	Qrr	If=11A, dI/dt=100A/μs		9	11	nC

NOTE :

1. The value of Rθja 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 themal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The Rθja is the sum of the thermal impedance from junction to lead Rθjl 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.

■Typical electrical and thermal characteristics

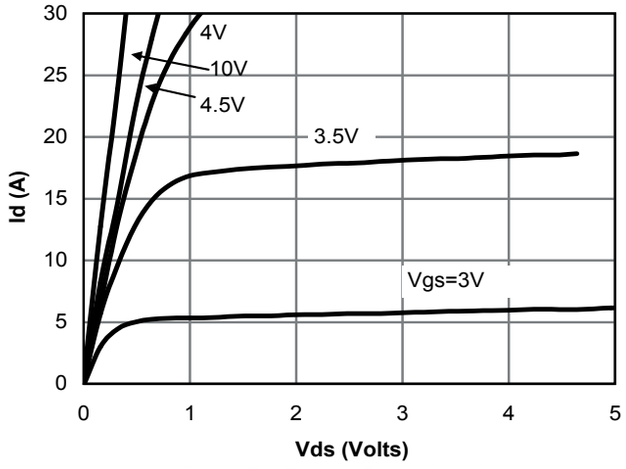


Fig 1: On-Region Characteristics

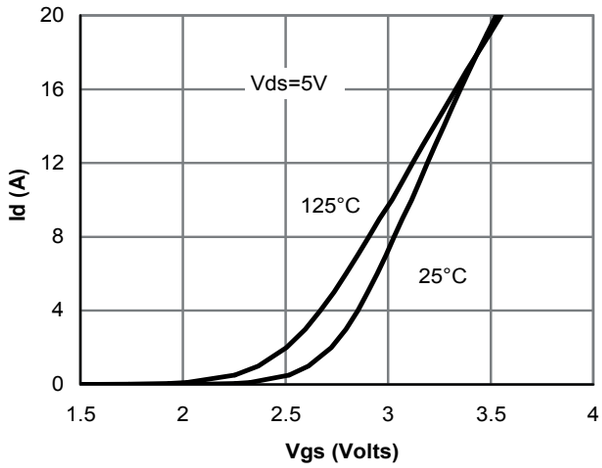


Figure 2: Transfer Characteristics

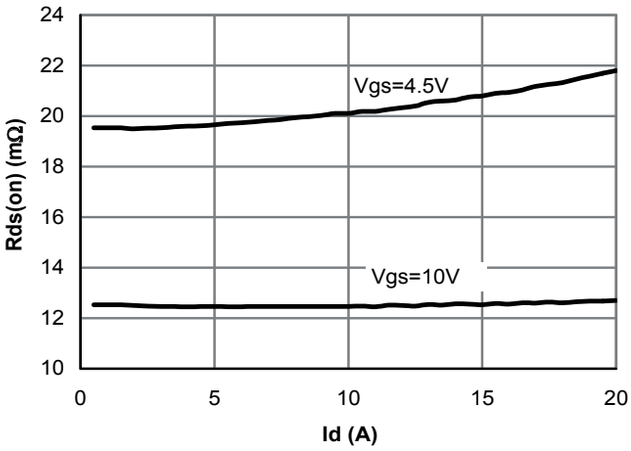


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

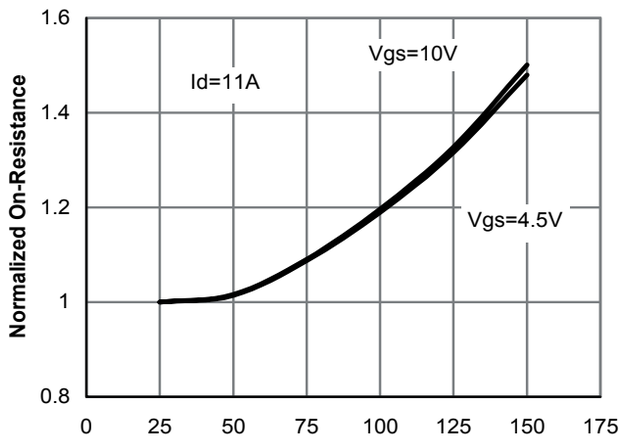


Figure 4: On-Resistance vs. Junction Temperature

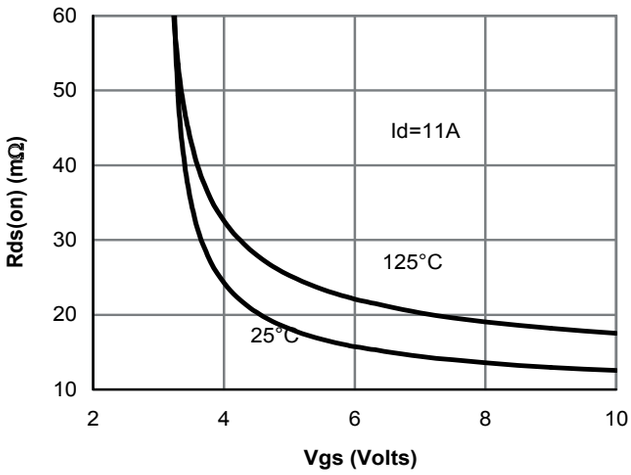


Figure 5: On-Resistance vs. Gate-Source Voltage

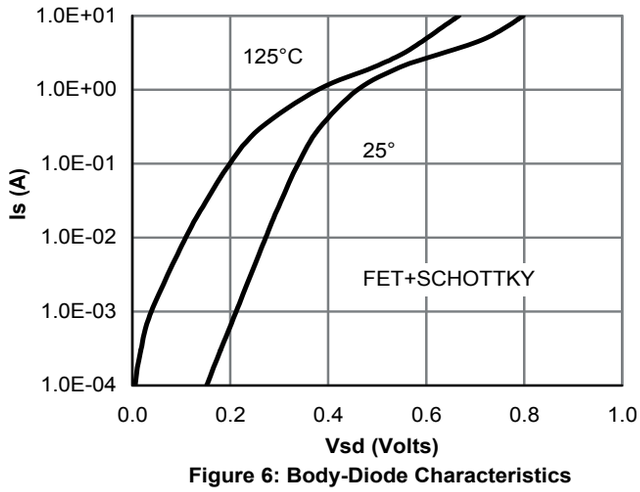


Figure 6: Body-Diode Characteristics

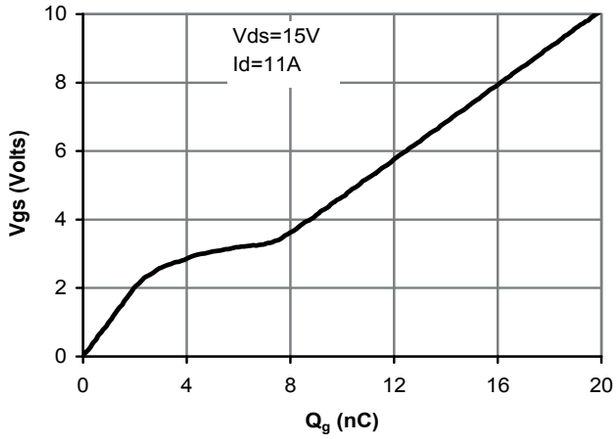


Figure 7: Gate-Charge Characteristics

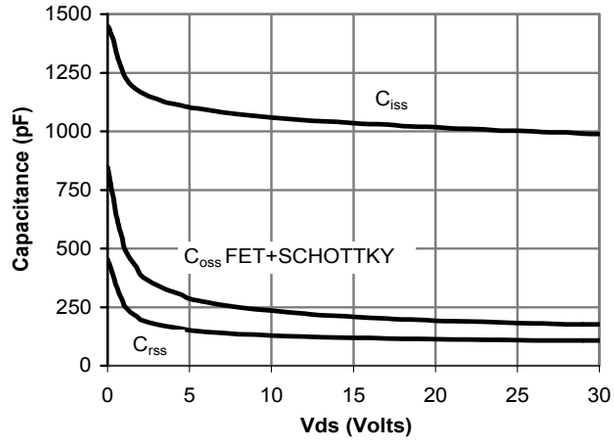


Figure 8: Capacitance Characteristics

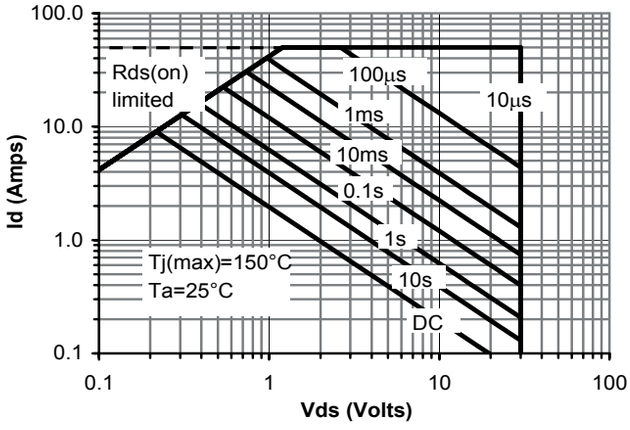


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

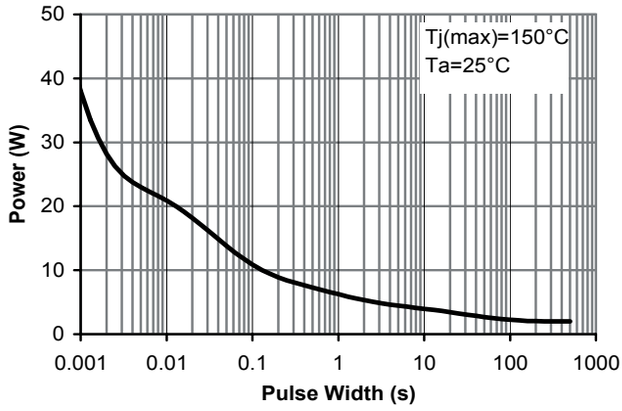


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

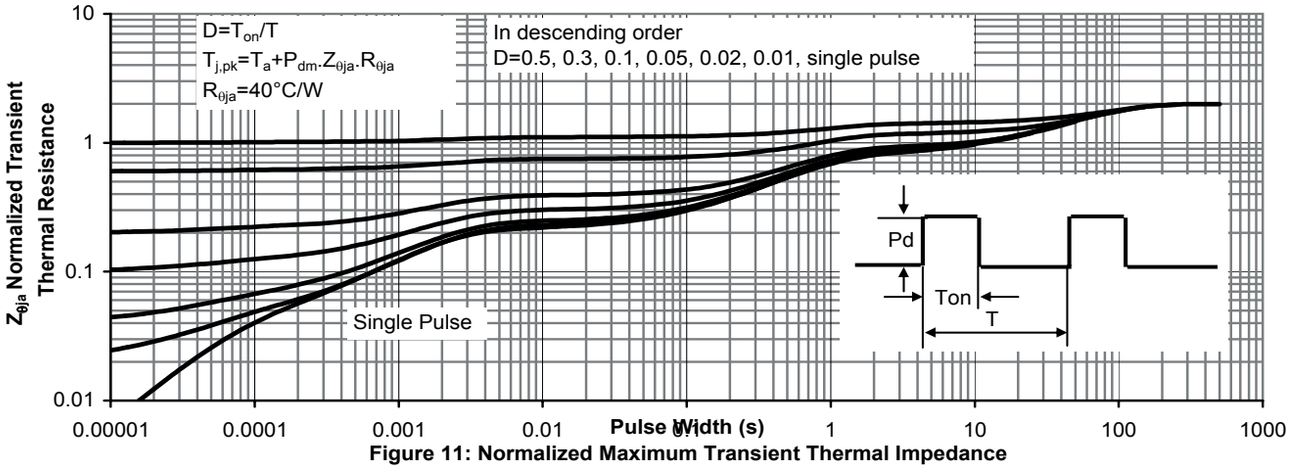


Figure 11: Normalized Maximum Transient Thermal Impedance