

# Single N-channel MOSFET with schottky diode

ELM14702AA-N

## General description

ELM14702AA-N uses advanced trench technology to provide excellent  $R_{ds(on)}$  and low gate charge.

## Features

- $V_{ds}=30V$
  - $I_d=11A$
  - $R_{ds(on)} < 16m\Omega$  ( $V_{gs}=10V$ )
  - $R_{ds(on)} < 25m\Omega$  ( $V_{gs}=4.5V$ )
- Schottky diode
- $V_{ds}(V)=30V$
  - $I_f=3A$
  - $V_f < 0.5V@1A$

## Maximum absolute ratings

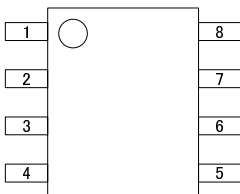
Parameter	Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage	$V_{ds}$	30		V	
Gate-source voltage	$V_{gs}$	$\pm 20$		V	
Continuous drain current	$I_d$			$T_a=25^\circ C$	1
				$T_a=70^\circ C$	
Pulsed drain current	$I_{dm}$	50		A	2
Schottky reverse voltage	$V_{ka}$		30	V	
Continuous forward current	$I_f$			$T_a=25^\circ C$	1
				$T_a=70^\circ C$	
Pulsed diode forward current	$I_{fm}$		30	A	2
Power dissipation	$P_d$			$T_a=25^\circ C$	
				$T_a=70^\circ C$	
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	$R\theta_{ja}$	31	40	$^\circ C/W$	1
Maximum junction-to-ambient		Steady-state	59	75	
Maximum junction-to-lead	$R\theta_{jl}$	16	24	$^\circ C/W$	3
Parameter (Schottky)	Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$R\theta_{ja}$	36	40	$^\circ C/W$	1
Maximum junction-to-ambient		Steady-state	67	75	
Maximum junction-to-lead	$R\theta_{jl}$	25	30	$^\circ C/W$	3

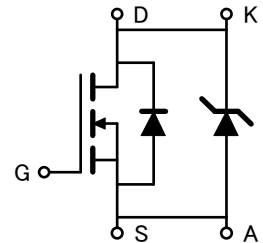
## Pin configuration

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



# Single N-channel MOSFET with schottky diode

## ELM14702AA-N

### Electrical characteristics

Ta=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
<b>STATIC PARAMETERS</b>						
Drain-source breakdown voltage	BVdss	Id=250 μA, 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=250 μA	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		13.4	16.0	mΩ
		Id=11A		16.8	21.0	
		Tj=125°C				
		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
<b>DYNAMIC PARAMETERS</b>						
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
<b>SWITCHING PARAMETERS</b>						
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)			4.5	7.0	ns
Turn-on rise time	tr	Vgs=10V, Vds=15V		3.9	7.0	ns
Turn-off delay time	td(off)	RI=1.35 Ω, Rgen=3 Ω		17.4	30.0	ns
Turn-off fall time	tf			3.2	5.7	ns
Body diode+schottky reverse recovery time	trr	If=11A, dl/dt=100A/μs		19	23	ns
Body diode+schottky reverse recovery charge	Qrr	If=11A, dl/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 thermal 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.

# Single N-channel MOSFET with schottky diode

ELM14702AA-N

## Typical electrical and thermal characteristics

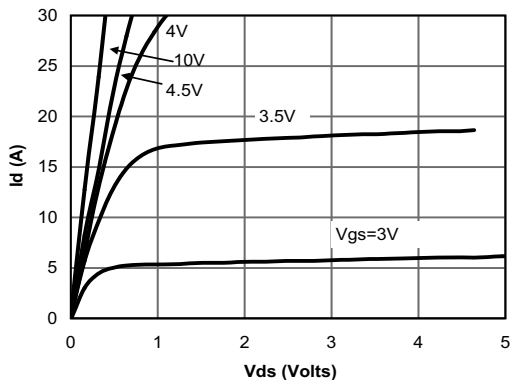


Fig 1: On-Region Characteristics

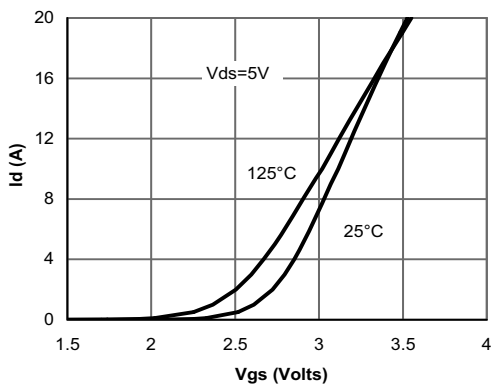


Figure 2: Transfer Characteristics

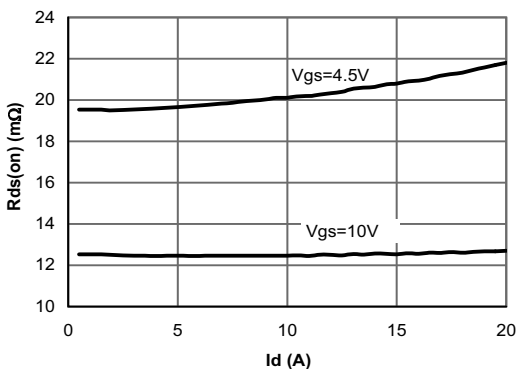


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

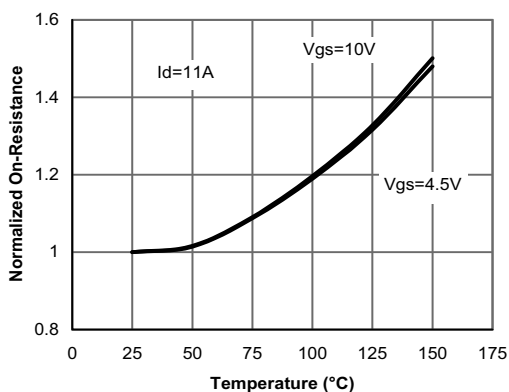


Figure 4: On-Resistance vs. Junction Temperature

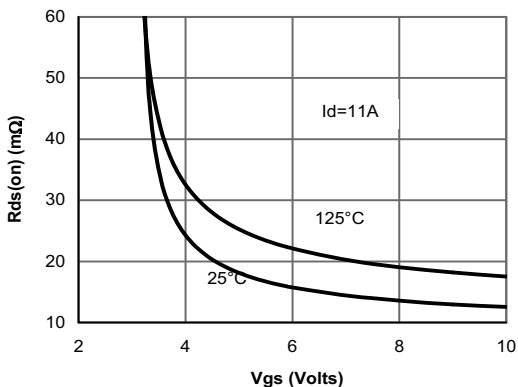


Figure 5: On-Resistance vs. Gate-Source Voltage

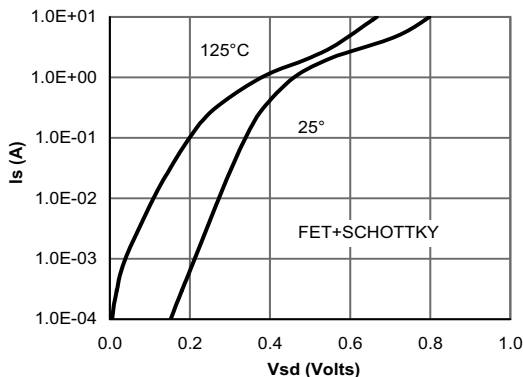


Figure 6: Body-Diode Characteristics

# Single N-channel MOSFET with schottky diode

ELM14702AA-N

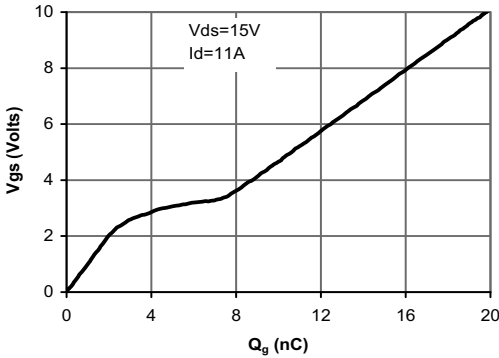


Figure 7: Gate-Charge Characteristics

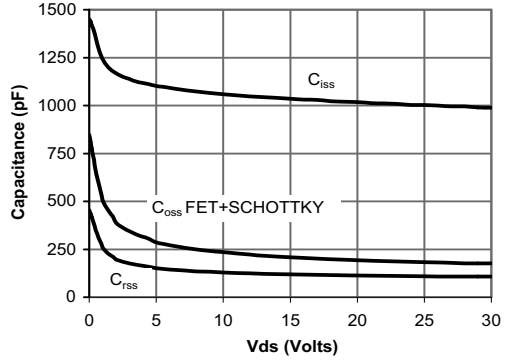


Figure 8: Capacitance Characteristics

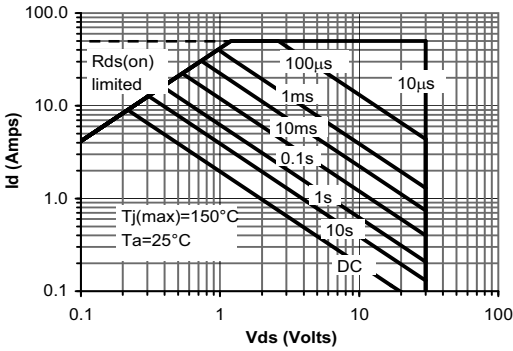


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

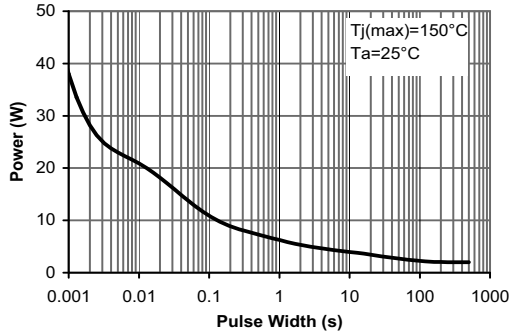


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

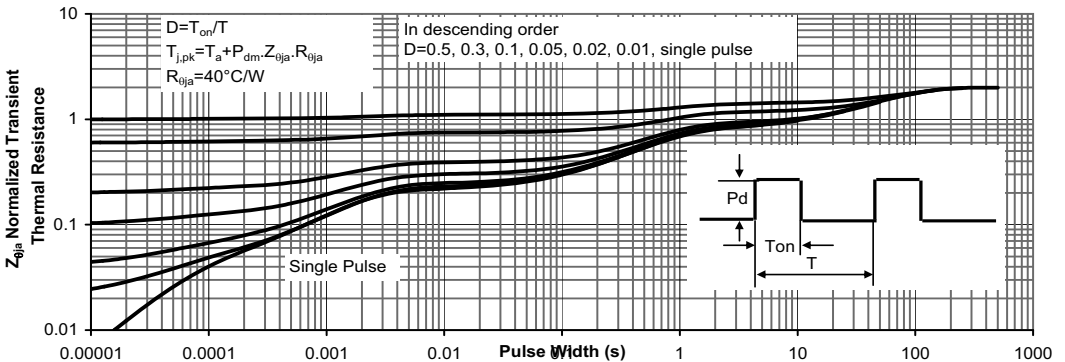


Figure 11: Normalized Maximum Transient Thermal Impedance