Dual N-channel MOSFET with schottky diode

ELM14906AA-N

■General description

ELM14906AA-N uses advanced trench technology to provide excellent Rds(on) and low gate charge.

■Features

- Vds=30V
- Id=7A (Vgs=10V)
- Rds(on) < 27mΩ (Vgs=10V)
- Rds(on) < 32mΩ (Vgs=4.5V)
- Rds(on) < 50mΩ (Vgs=2.5V)

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

■Maximum absolute ratings

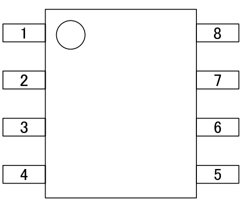
Parameter		Symbol	MOSFET	Schottky	Unit	Note
Drain-source voltage		Vds	30		V	
Gate-source voltage		Vgs	±12		V	
Continuous drain current	Ta=25℃	Id	7		A	1
	Ta=70℃		6			
Pulsed drain current		Idm	40		A	2
Schottky reverse voltage		Vka		30	V	
Continuous forward current	Ta=25℃	If		3	A	1
	Ta=70℃			2		
Pulsed forward current		Ifm		40	A	2
Power dissipation	Ta=25℃	Pd	2.00	2.00	W	
	Ta=70℃		1.44	1.44		
Junction and storage temperature range		Tj, Tstg	-55 to 150	-55 to 150	℃	

■Thermal characteristics

Parameter (MOSFET)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≦10s	Rθja	48.0	62.5	℃/W	1
Maximum junction-to-ambient	Steady-state		74.0	110.0	℃/W	
Maximum junction-to-lead	Steady-state	Rθjl	35.0	40.0	℃/W	3
Parameter (Schottky)		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≦10s	Rθja	47.5	62.5	℃/W	1
Maximum junction-to-ambient	Steady-state		71.0	110.0	℃/W	
Maximum junction-to-lead	Steady-state	Rθjl	32.0	40.0	℃/W	3

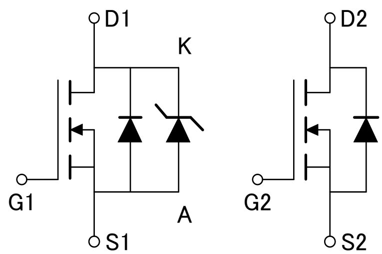
■Pin configuration

SOP-8 (TOP VIEW)



Pin No.	Pin name
1	DRAIN2
2	DRAIN2
3	GATE1
4	SOURCE1/ANODE
5	DRAIN1/SOURCE2/CATHODE
6	DRAIN1/SOURCE2/CATHODE
7	DRAIN1/SOURCE2/CATHODE
8	GATE2

■Circuit



ELM TECHNOLOGY

■Electrical characteristics

Ta=25℃

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	Idss	Vds=24V Vgs=0V			0.002	1.000	μA
			Tj=55℃			5.000	μA
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V				100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		0.7	1.0	1.4	V
On state drain current	Id(on)	Vgs=4.5V, Vds=5V		25			A
Static drain-source on-resistance	Rds(on)	Vgs=10V Id=7A			22	27	mΩ
			Tj=125℃		31	40	mΩ
		Vgs=4.5V, Id=6A			26	32	mΩ
		Vgs=2.5V, Id=5A			38	50	mΩ
Forward transconductance	Gfs	Vds=5V, Id=5A		12	16		S
Diode forward voltage	Vsd	Is=1A			0.71	1.00	V
Max. body-diode continuous current	Is					3	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V, f=1MHz			846	1050	pF
Output capacitance	Coss	Vgs=0V, Vds=15V, f=1MHz			96		pF
Reverse transfer capacitance	Crss	Vgs=0V, Vds=15V, f=1MHz			67		pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz			1.24	3.60	Ω
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=4.5V, Vds=15V, Id=7A			9.6	12.0	nC
Gate-source charge	Qgs	Vgs=4.5V, Vds=15V, Id=7A			1.6		nC
Gate-drain charge	Qgd	Vgs=4.5V, Vds=15V, Id=7A			3.0		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=15V Rl=2.2Ω, Rgen=3Ω			3.2	4.8	ns
Turn-on rise time	tr	Vgs=10V, Vds=15V Rl=2.2Ω, Rgen=3Ω			4.1	6.2	ns
Turn-off delay time	td(off)	Vgs=10V, Vds=15V Rl=2.2Ω, Rgen=3Ω			26.3	40.0	ns
Turn-off fall time	tf	Vgs=10V, Vds=15V Rl=2.2Ω, Rgen=3Ω			3.7	5.5	ns
Body diode reverse recovery time	trr	If=5A, dl/dt=100A/μs			15.5	20.0	ns
Body diode reverse recovery charge	Qrr	If=5A, dl/dt=100A/μs			7.9	12.0	nC
SCHOTTKY PARAMETERS							
Forward voltage drop	Vf	If=1A			0.45	0.50	V
Max. reverse leakage current	Irm	Vr=30V			0.007	0.050	mA
		Vr=30V	Tj=125℃		3.2	10.0	mA
			Tj=150℃		12.0	20.0	mA
Junction capacitance	Ct	Vr=15V			37		pF

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℃. 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 6,12,14 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℃. The SOA curve provides a single pulse rating.

■Typical electrical and thermal characteristics

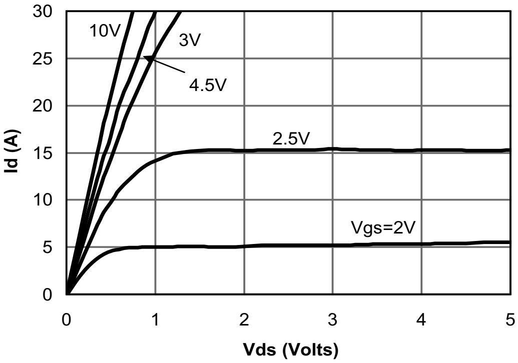


Fig 1: On-Region Characteristics

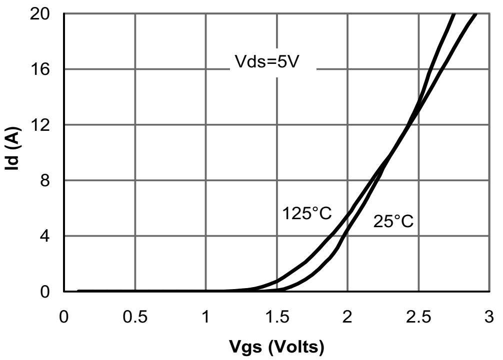


Figure 2: Transfer Characteristics

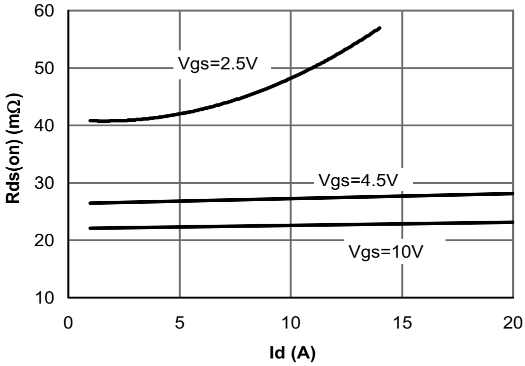


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

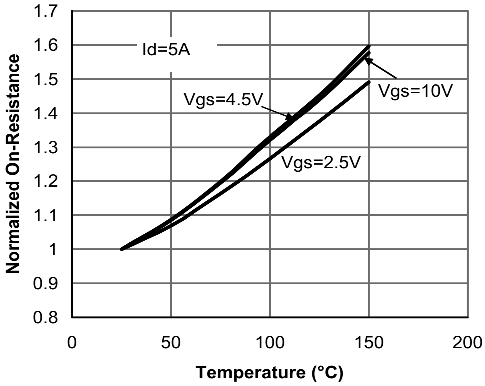


Figure 4: On resistance vs. Junction Temperature

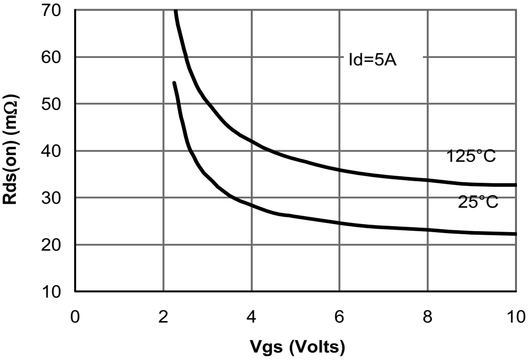


Figure 5: On resistance vs. Gate-Source Voltage

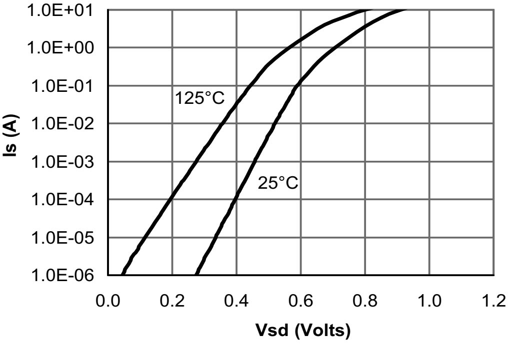


Figure 6: Body-Diode Characteristics

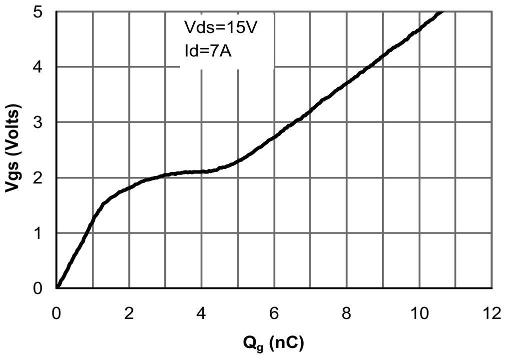


Figure 7: Gate-Charge Characteristics

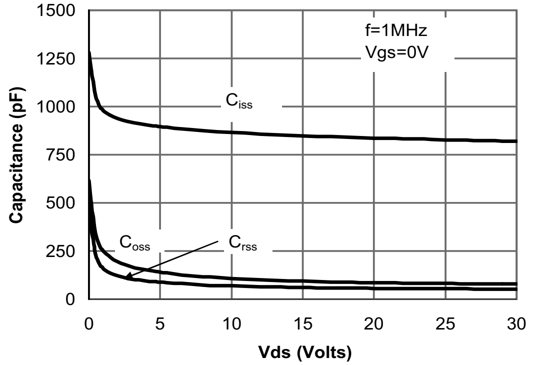


Figure 8: Capacitance Characteristics

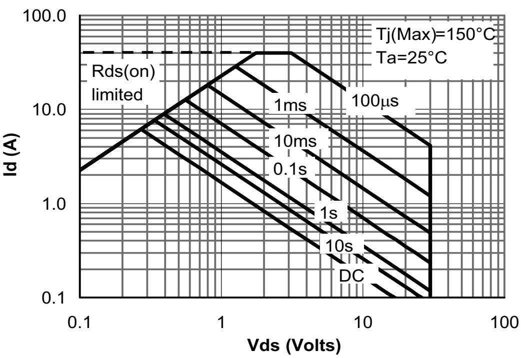


Figure 9: Maximum Forward Biased Safe Operating Area (Note 5)

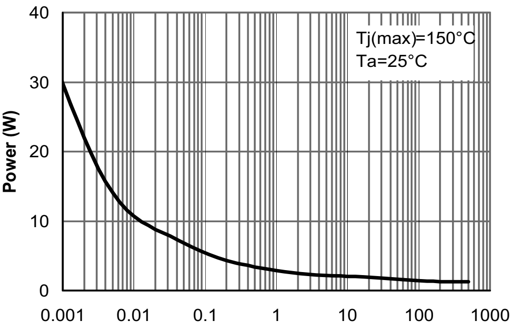


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note 5)

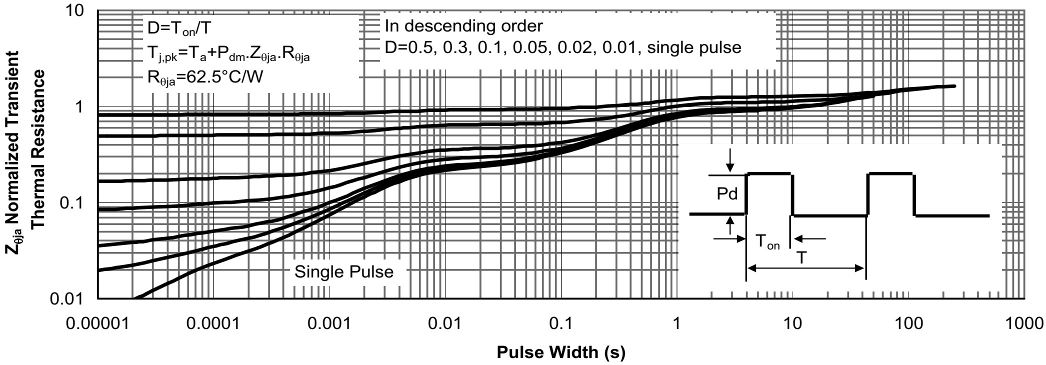


Figure 11: Normalized Maximum Transient Thermal Impedance

■Typical electrical and thermal characteristics (Schottky)

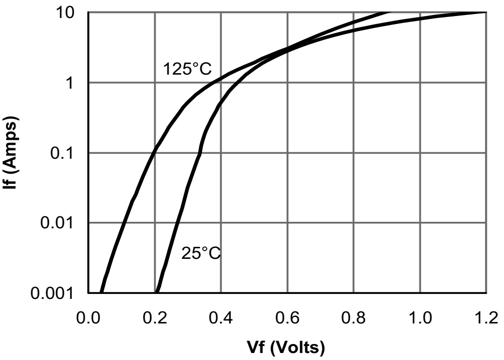


Figure 12: Schottky Forward Characteristics

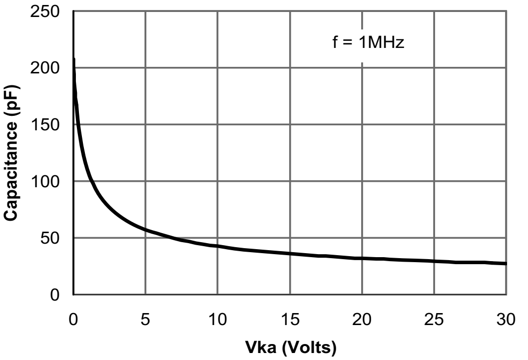


Figure 13: Schottky Capacitance Characteristics

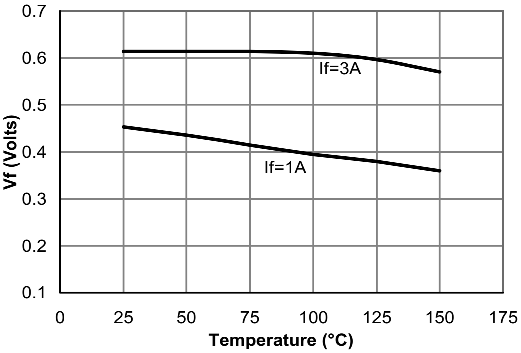


Figure 14: Schottky Forward Drop vs. Junction Temperature

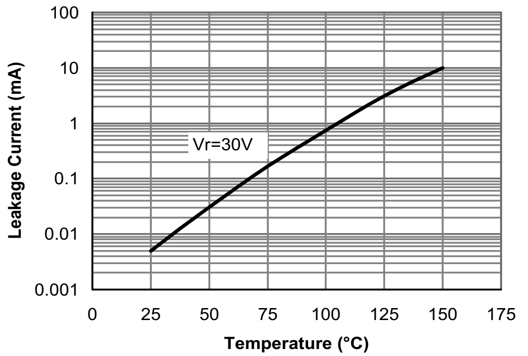


Figure 15: Schottky Leakage current vs. Junction Temperature

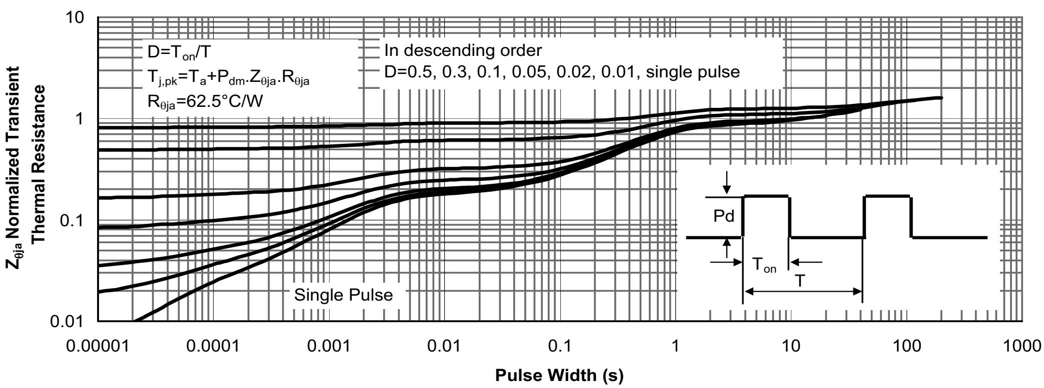


Figure 15: Schottky Normalized Maximum Transient Thermal Impedance