Single N-channel MOSFET

ELM14354AA-N

■General description

ELM14354AA-N uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate resistance.

■Features

- Vds=30V
- Id=23A (Vgs=10V)
- Rds(on) < 3.7mΩ (Vgs=10V)
- Rds(on) < 5.3mΩ (Vgs=4.5V)

■Maximum absolute ratings

Ta=25°C. Unless otherwise noted.

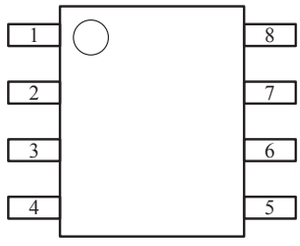
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	30	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current	Ta=25°C	Id	23	A	
	Ta=100°C		14		
Pulsed drain current		Idm	174	A	3
Avalanche current		Ias	37	A	3
Repetitive avalanche energy	L=0.1mH	Eas	68	mJ	3
Vds Spike	100ns	Vspike	36	V	
Power dissipation	Tc=25°C	Pd	3.1	W	2
	Tc=100°C		1.2		
Junction and storage temperature range		Tj, Tstg	-55 to 150	°C	

■Thermal characteristics

Parameter		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	1, 4
Maximum junction-to-lead	Steady-state	Rθjl	16	24	°C/W	

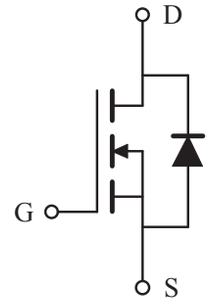
■Pin configuration

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. Unless otherwise noted.

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=30V, Vgs=0V				1	μA
			Ta=55°C			5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±20V				100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		1.2	1.8	2.2	V
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=20A			3.0	3.7	mΩ
			Ta=125°C		4.1	5.0	
		Vgs=4.5V, Id=20A			4.1	5.3	mΩ
Forward transconductance	Gfs	Vds=5V, Id=20A			105		S
Diode forward voltage	Vsd	Is=1A, Vgs=0V			0.7	1.0	V
Max. body-diode continuous current	Is					4	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V, f=1MHz			2010		pF
Output capacitance	Coss				898		pF
Reverse transfer capacitance	Crss				124		pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz		0.9	1.8	2.7	Ω
SWITCHING PARAMETERS							
Total gate charge (10V)	Qg	Vgs=10V, Vds=15V, Id=20A			36	49	nC
Total gate charge (4.5V)					17	23	nC
Gate-source charge	Qgs				6		nC
Gate-drain charge	Qgd				8		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=15V RL=0.75Ω, Rgen=3Ω			7.5		ns
Turn-on rise time	tr				4.0		ns
Turn-off delay time	td(off)				37.0		ns
Turn-off fall time	tf				7.5		ns
Body diode reverse recovery time	trr	If=20A, dIf/dt=500A/μs			14.0		ns
Body diode reverse recovery charge	Qrr	If=20A, dIf/dt=500A/μs			20.3		nC

NOTE :

1. The value of Rθja is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, in a still air environment with Ta=25°C. The value in any given application depends on the user's specific board design.
2. The power dissipation Pd is based on Tj(max)=150°C, using ≤ 10s junction-to-ambient thermal resistance.
3. Repetitive rating, pulse width limited by junction temperature Tj(max)=150°C. Ratings are based on low frequency and duty cycles to keep initial Tj=25°C.
4. The Rθja is the sum of the thermal impedence from junction to lead Rθjal and lead to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300ms pulses, duty cycle 0.5% max.
6. These curves are based on the junction-to-ambient thermal impedence which is measured with the device mounted on 1in² FR-4 board with 2oz. Copper, assuming a maximum junction temperature of Tj(max)=150°C. The SOA curve provides a single pulse rating.

■Typical electrical and thermal characteristics

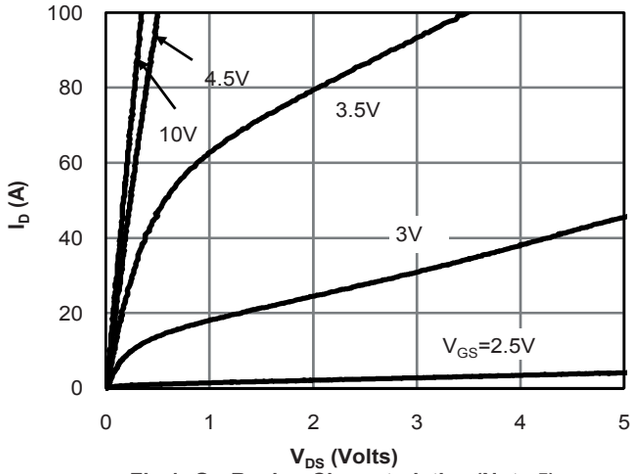


Fig 1: On-Region Characteristics (Note 5)

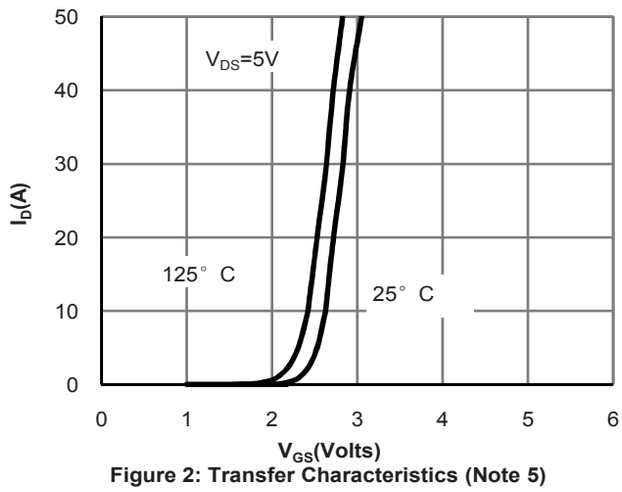


Figure 2: Transfer Characteristics (Note 5)

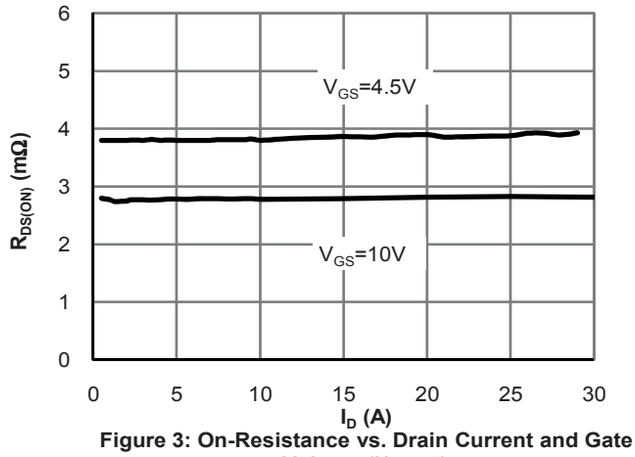


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note 5)

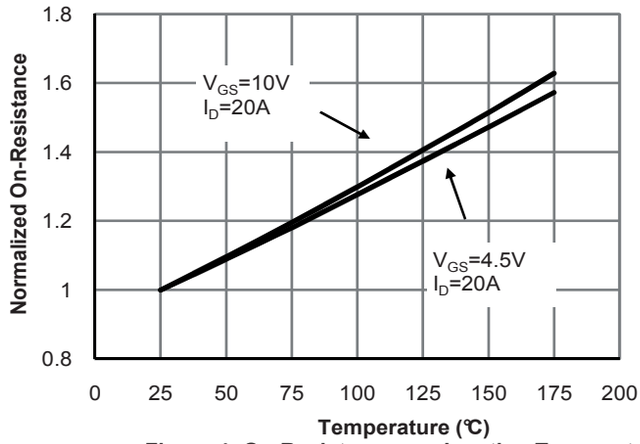


Figure 4: On-Resistance vs. Junction Temperatui (Note 5)

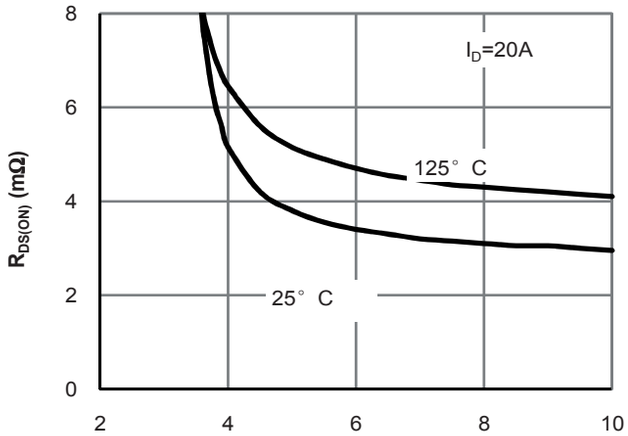


Figure 5: On-Resistance vs. Gate-Source Voltage (Note 5)

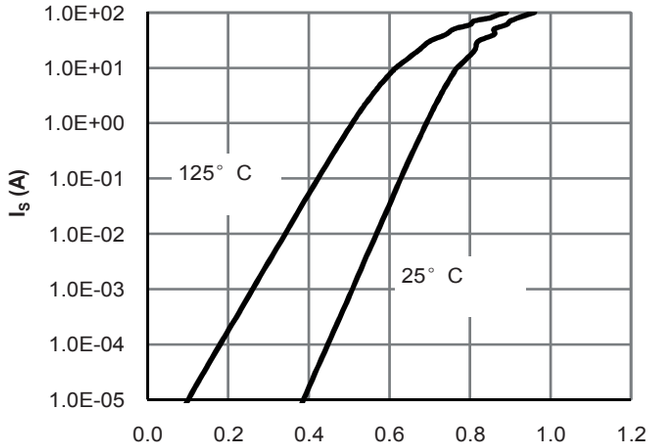


Figure 6: Body-Diode Characteristics (Note 5)

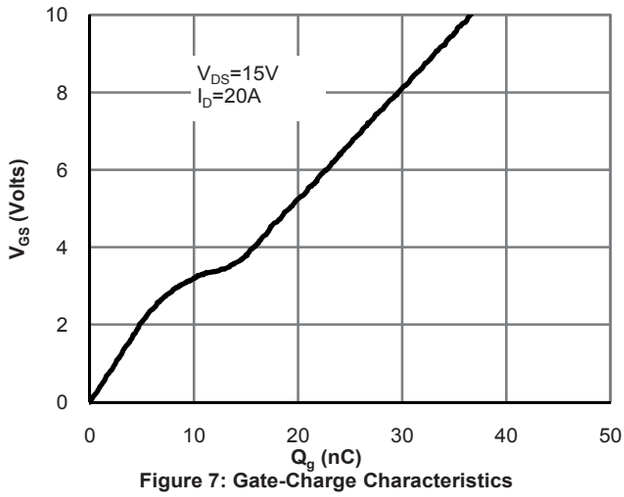


Figure 7: Gate-Charge Characteristics

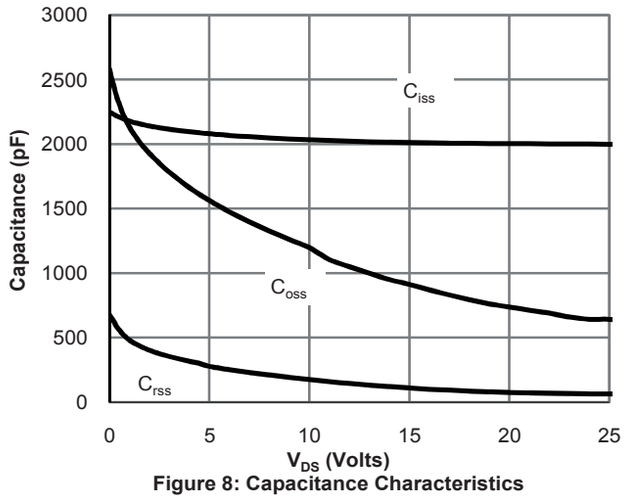


Figure 8: Capacitance Characteristics

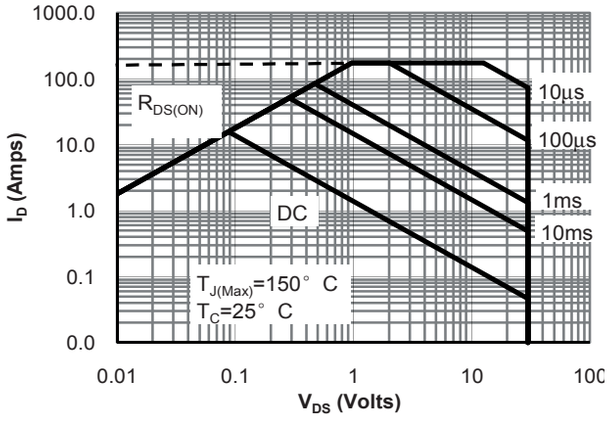
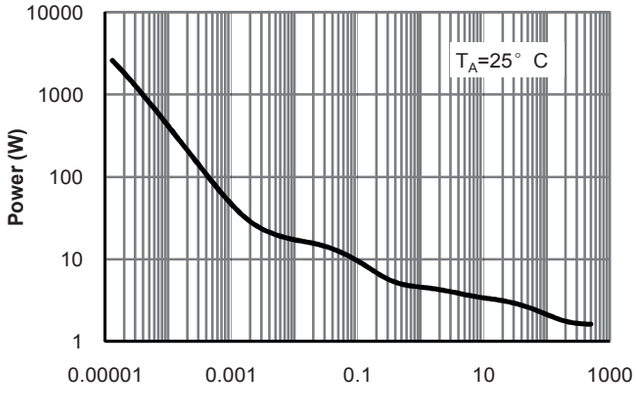
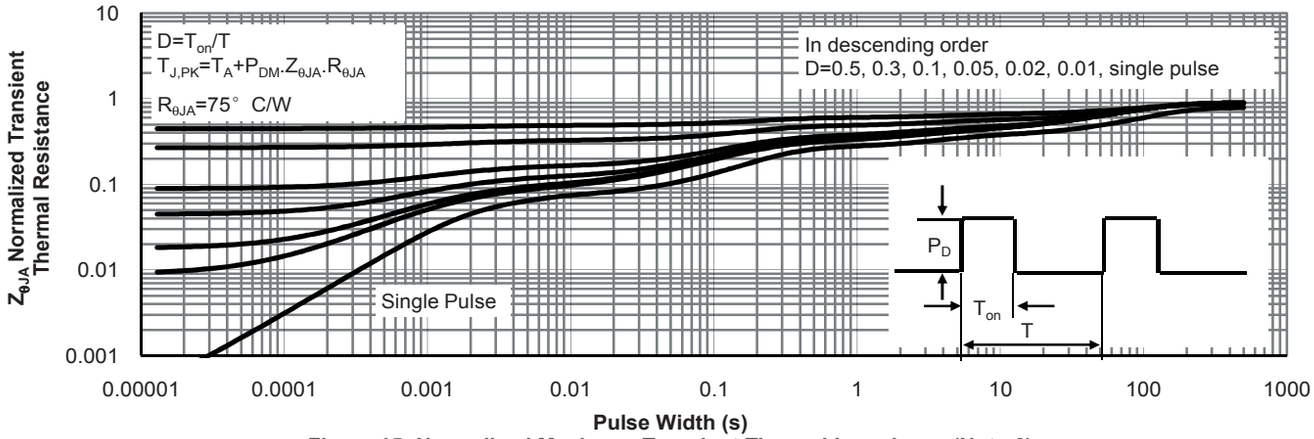


Figure 9: Maximum Forward Biased Safe Operating Area (Note 6)



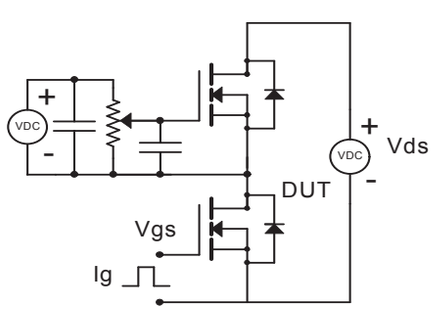
Pulse Width (s)
Figure 14: Single Pulse Power Rating Junction-to-Ambient (Note 6)

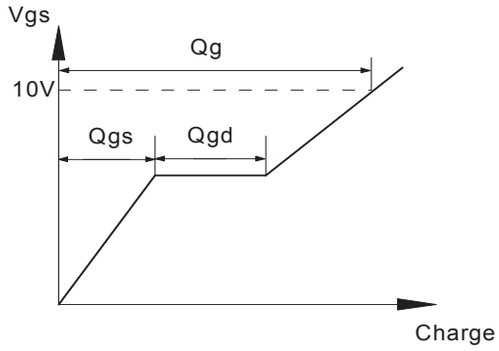


Pulse Width (s)
Figure 15: Normalized Maximum Transient Thermal Impedance (Note 6)

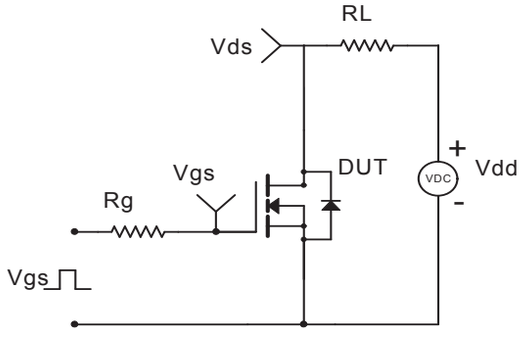
■Test circuit and waveform

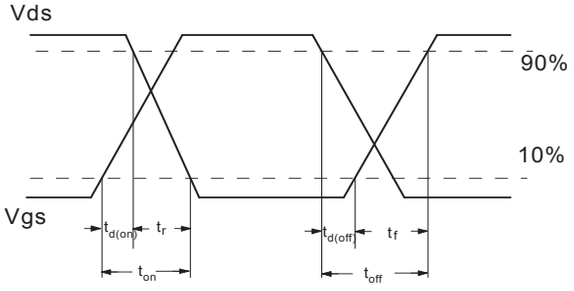
Gate Charge Test Circuit & Waveform



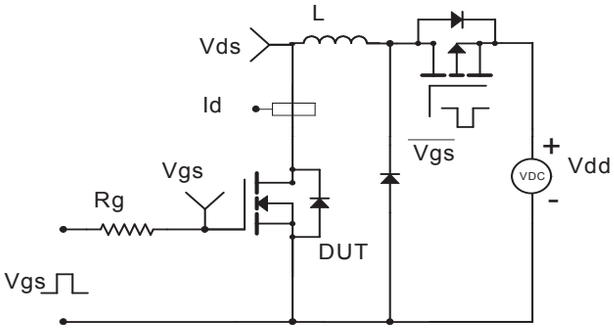


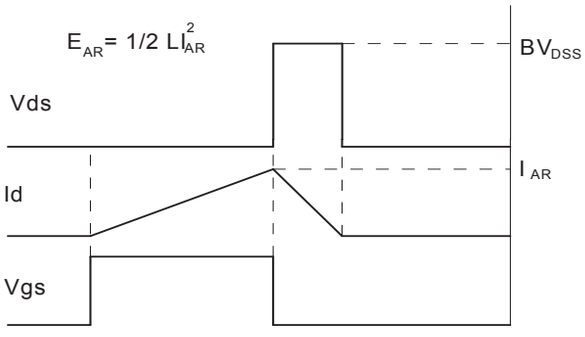
Resistive Switching Test Circuit & Waveforms





Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms