Single N-channel MOSFET

ELM13424CA-S

■General description

ELM13424CA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and operation with gate voltages as low as 2.5V.

■Features

- Vds=30V
- Id=3.8A (Vgs=10V)
- Rds(on) < 55mΩ (Vgs=10V)
- Rds(on) < 65mΩ (Vgs=4.5V)
- Rds(on) < 85mΩ (Vgs=2.5V)

■Maximum absolute ratings

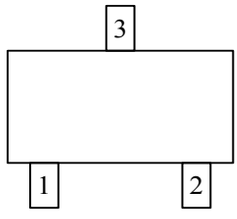
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	30	V	
Gate-source voltage		Vgs	±12	V	
Continuous drain current	Ta=25°C	Id	3.8	A	
	Ta=70°C		3.1		
Pulsed drain current		Idm	15	A	3
Power dissipation	Ta=25°C	Pd	1.4	W	2
	Ta=70°C		0.9		
Junction and storage temperature range		Tj, Tstg	-55 to 150	°C	

■Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤10s	Rθja	70	90	°C/W	1
Maximum junction-to-ambient	Steady-state		100	125	°C/W	1, 4
Maximum junction-to-lead	Steady-state	Rθjl	63	80	°C/W	

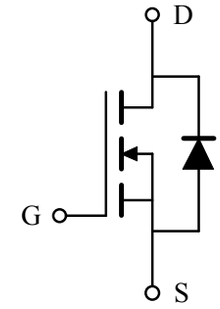
■Pin configuration

SOT-23(TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	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	Idss	Vds=30V, Vgs=0V				1	μA
			Tj=55°C			5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±12V				±100	nA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=250μA		0.5	1.0	1.5	V
On state drain current	Id(on)	Vgs=10V, Vds=5V		15			A
Static drain-source on-resistance	Rds(on)	Vgs=10V, Id=3.8A			43	55	mΩ
			Tj=125°C		70	84	
		Vgs=4.5V, Id=3.5A			47	65	mΩ
		Vgs=2.5V, Id=1A			59	85	mΩ
Forward transconductance	Gfs	Vds=5V, Id=3.8A			14		S
Diode forward voltage	Vsd	Is=1A, Vgs=0V			0.75	1.00	V
Max. body-diode continuous current	Is					1.5	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=15V, f=1MHz		185	235	285	pF
Output capacitance	Coss			25	35	45	pF
Reverse transfer capacitance	Crss			10	18	25	pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz		2.1	4.3	6.5	Ω
SWITCHING PARAMETERS							
Total gate charge (Vgs=10V)	Qg	Vgs=10V, Vds=15V, Id=3.8A			10.00	12.00	nC
Total gate charge (Vgs=4.5V)					4.70		
Gate-source charge	Qgs				0.95		nC
Gate-drain charge	Qgd				1.60		nC
Turn-on delay time	td(on)	Vgs=10V, Vds=15V RL=3.95Ω, Rgen=3Ω			3.5		ns
Turn-on rise time	tr				1.5		ns
Turn-off delay time	td(off)				17.5		ns
Turn-off fall time	tf				2.5		ns
Body diode reverse recovery time	trr	If=3.8A, dl/dt=100A/μs			8.5	11.0	ns
Body diode reverse recovery charge	Qrr	If=3.8A, dl/dt=100A/μs			2.6	3.5	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 initialTJ=25°C.
4. The Rθja is the sum of the thermal impedence from junction to lead Rθjl and lead to ambient.
5. The static characteristics in Figures 1 to 6 are obtained using <300μs 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

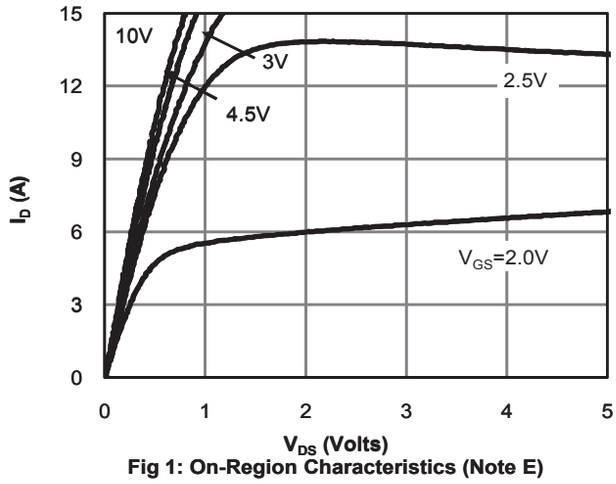


Fig 1: On-Region Characteristics (Note E)

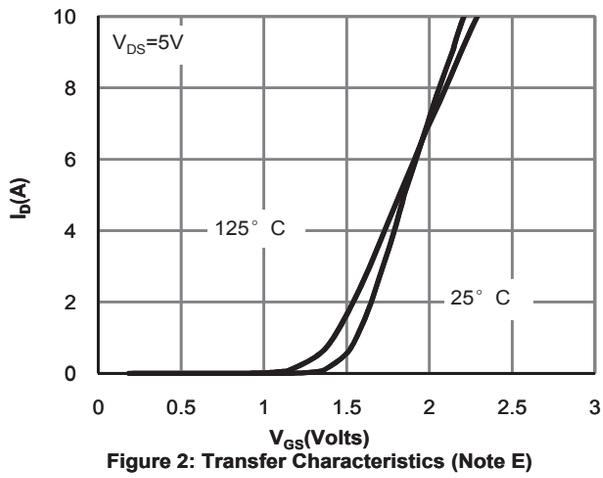


Figure 2: Transfer Characteristics (Note E)

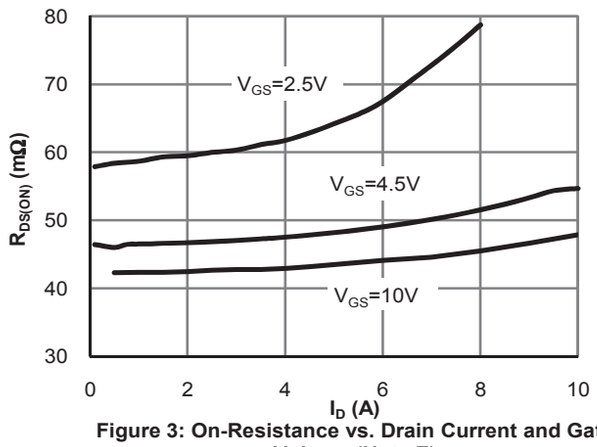


Figure 3: On-Resistance vs. Drain Current and Gate Voltage (Note E)

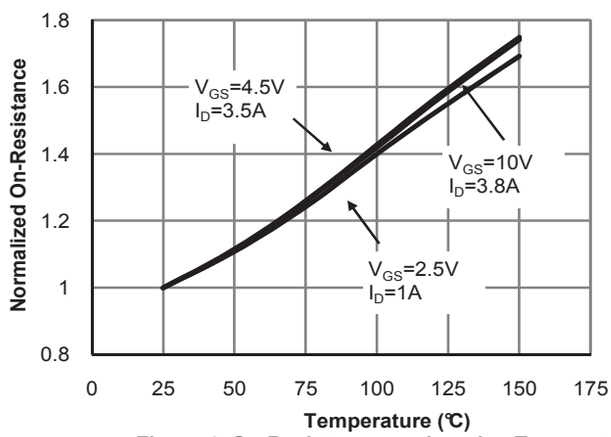


Figure 4: On-Resistance vs. Junction Temperatur (Note E)

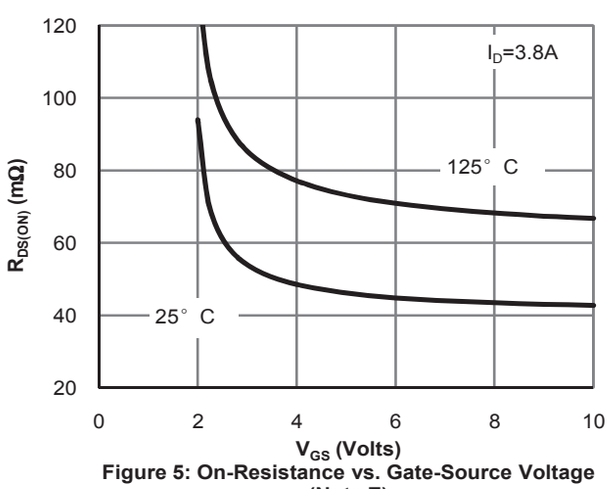


Figure 5: On-Resistance vs. Gate-Source Voltage (Note E)

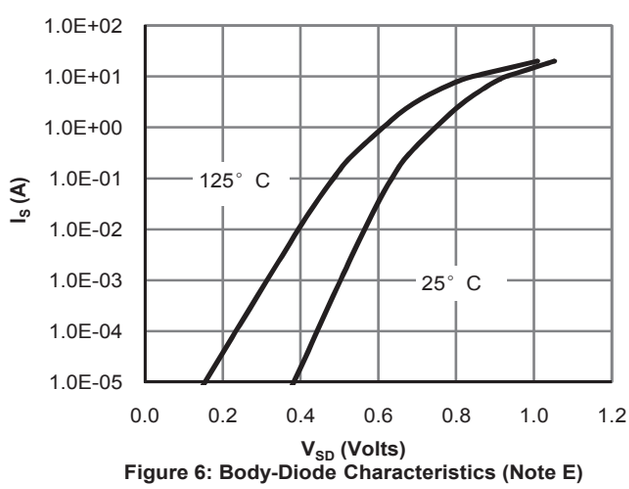


Figure 6: Body-Diode Characteristics (Note E)

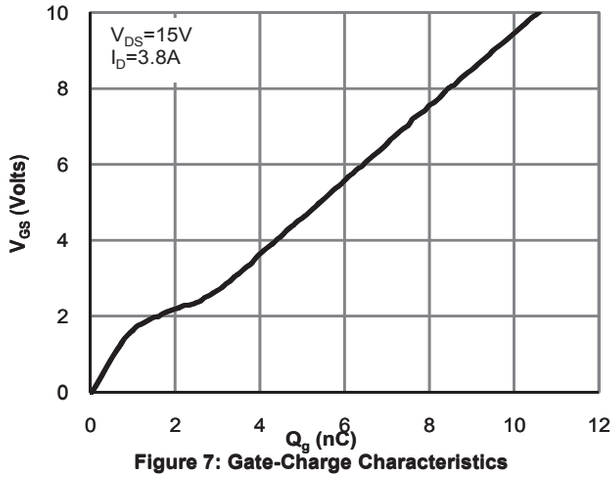


Figure 7: Gate-Charge Characteristics

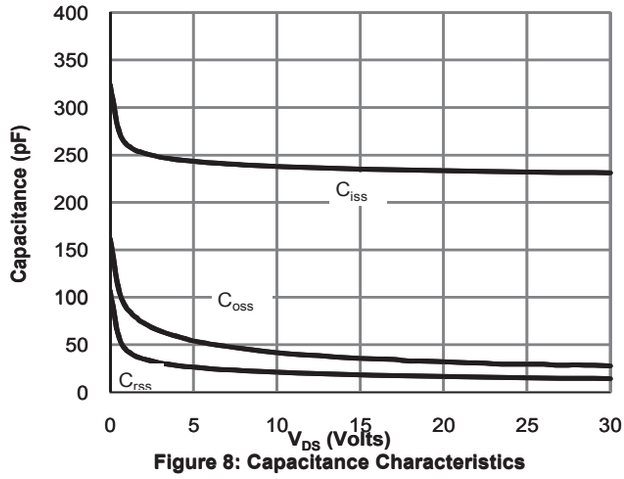


Figure 8: Capacitance Characteristics

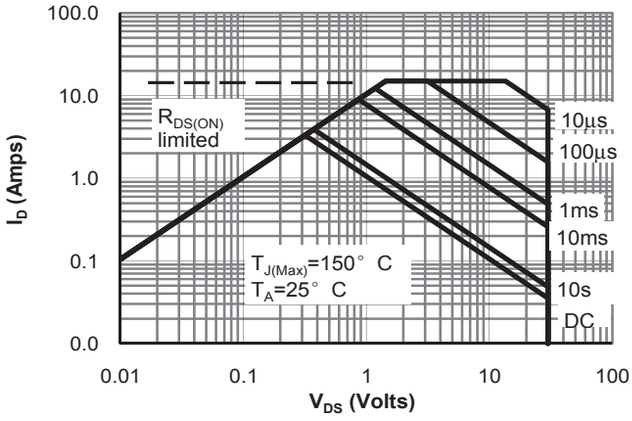


Figure 9: Maximum Forward Biased Safe Operating Area (Note F)

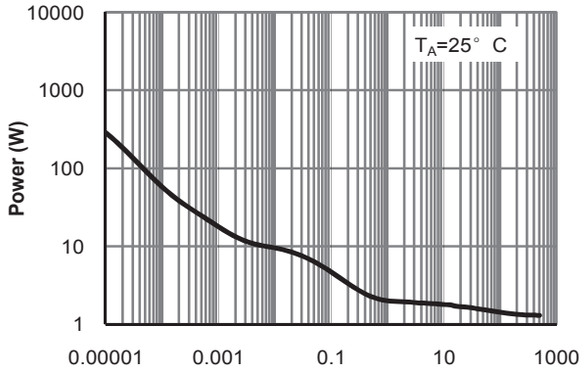


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note F)

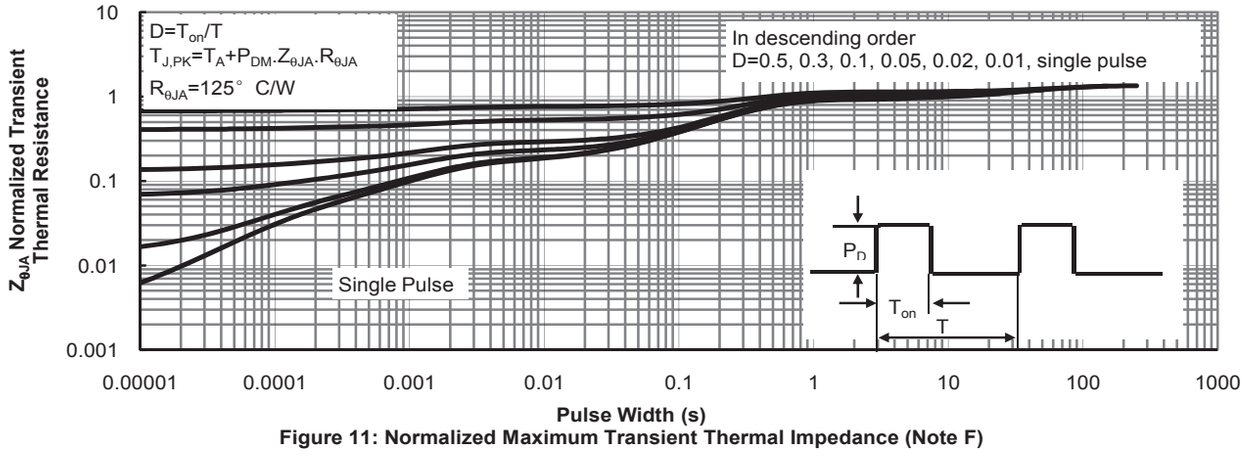
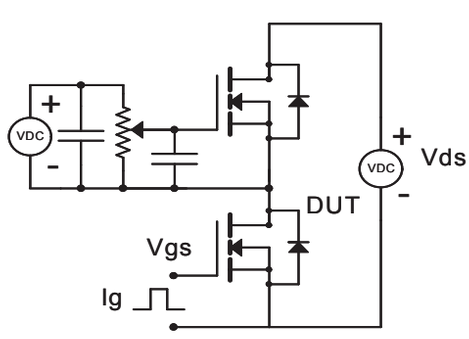
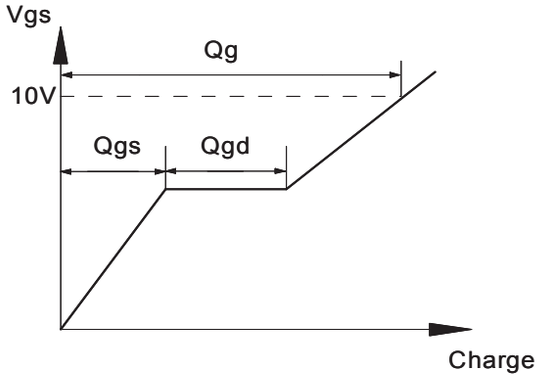


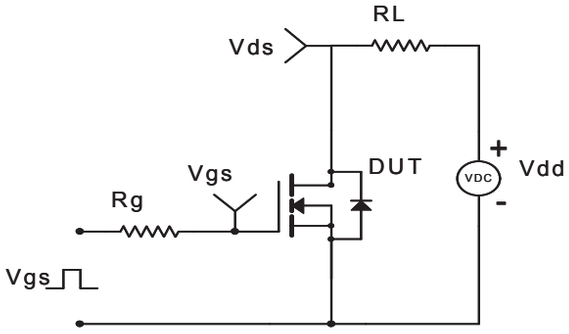
Figure 11: Normalized Maximum Transient Thermal Impedance (Note F)

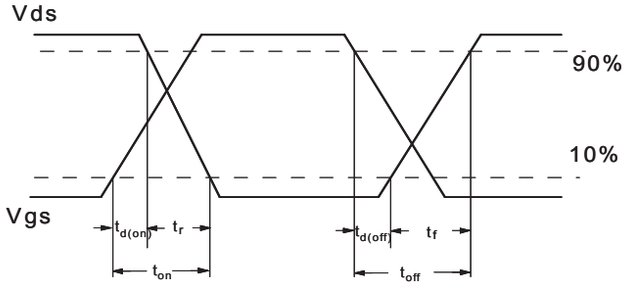
Gate Charge Test Circuit & Waveform





Resistive Switching Test Circuit & Waveforms





Diode Recovery Test Circuit & Waveforms