Single P-channel MOSFET

ELM13407CA-S

■General description

ELM13407CA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and low gate resistance.

■Features

- Vds=-30V
- Id=-4.1A (Vgs=-10V)
- Rds(on) < 52mΩ (Vgs=-10V)
- Rds(on) < 87mΩ (Vgs=-4.5V)

■Maximum absolute ratings

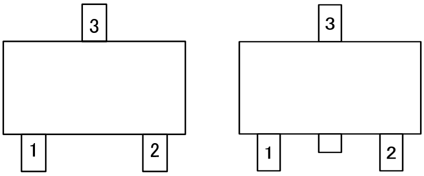
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	-30	V	
Gate-source voltage		Vgs	±20	V	
Continuous drain current	Ta=25℃	Id	-4.1	A	1
	Ta=70℃		-3.5		
Pulsed drain current		Idm	-20	A	2
Power dissipation	Ta=25℃	Pd	1.4	W	1
	Ta=70℃		1.0		
Junction and storage temperature range		Tj, Tstg	-55 to 150	℃	

■Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤10s	Rθja	65	90	℃/W	1
Maximum junction-to-ambient	Steady-state		85	125	℃/W	
Maximum junction-to-lead	Steady-state	Rθjl	43	60	℃/W	3

■Pin configuration

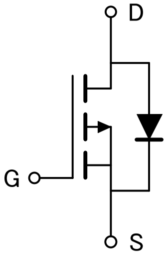
SOT-23 (TOP VIEW)



(Without extra bar) (With extra bar)

Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

■Circuit



■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				-1	μA
			Tj=55℃			-5	
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		-10			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V Id=-4.1A			40.5	52.0	mΩ
			Tj=125℃		57.0	73.0	
		Vgs=-4.5V, Id=-3A			64.0	87.0	mΩ
Forward transconductance	Gfs	Vds=-5V, Id=-4A		5.5	8.2		S
Diode forward voltage	Vsd	Is=-1A, Vgs=0V			-0.77	-1.00	V
Max. body-diode continuous current	Is					-2.2	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-15V, f=1MHz			700	840	pF
Output capacitance	Coss				120		pF
Reverse transfer capacitance	Crss				75		pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz			10	15	Ω
SWITCHING PARAMETERS							
Total gate charge (10V)	Qg	Vgs=-4.5V, Vds=-15V Id=-4A			14.3	18.0	nC
Total gate charge (4.5V)	Qg				7.0		nC
Gate-source charge	Qgs				3.1		nC
Gate-drain charge	Qgd				3.0		nC
Turn-on delay time	td(on)	Vgs=-10V, Vds=-15V Rl=3.6Ω, Rgen=3Ω			8.6		ns
Turn-on rise time	tr				5.0		ns
Turn-off delay time	td(off)				28.2		ns
Turn-off fall time	tf				13.5		ns
Body diode reverse recovery time	trr	If=-4A, dl/dt=100A/μs			27	36	ns
Body diode reverse recovery charge	Qrr				15		nC

NOTE :

1. The value of Rθja is measured with the device mounted on 1in^2 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 are obtained using 80μs pulses, duty cycle 0.5%max.
5. These tests are performed with the device mounted on 1in^2 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

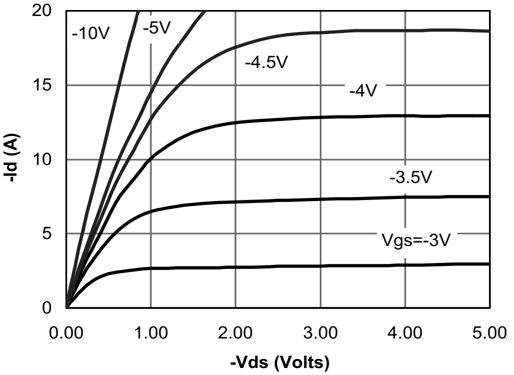


Figure 1: On-Region Characteristics

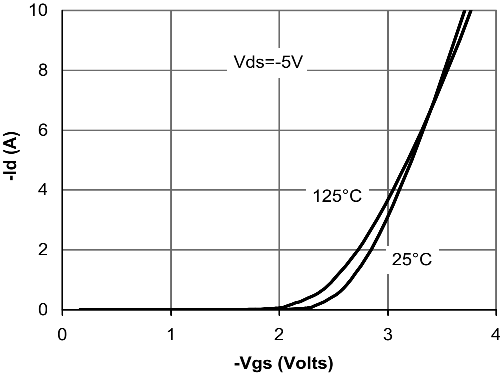


Figure 2: Transfer Characteristics

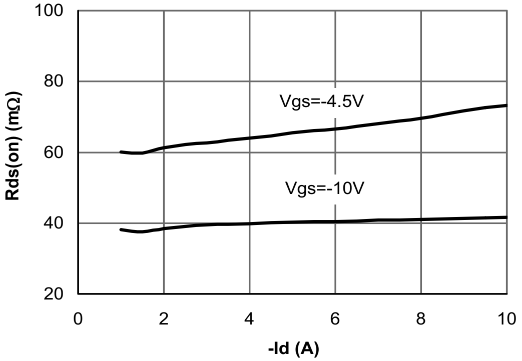


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

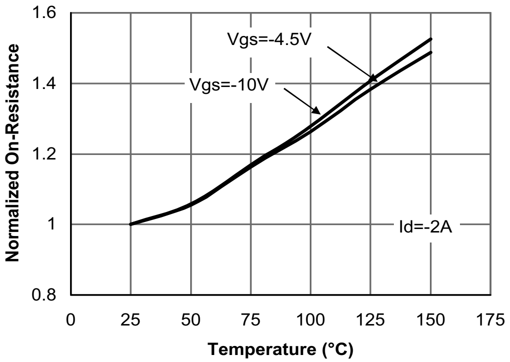


Figure 4: On-Resistance vs. Junction Temperature

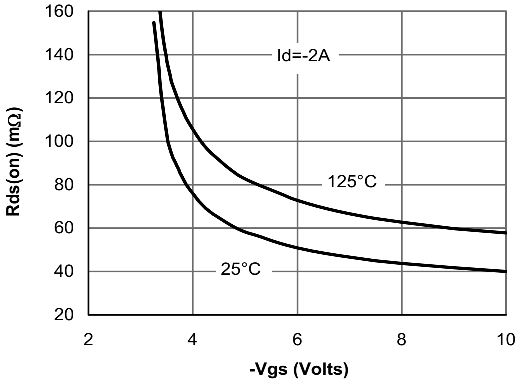


Figure 5: On-Resistance vs. Gate-Source Voltage

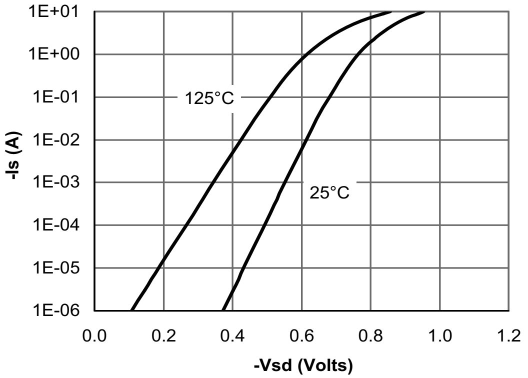


Figure 6: Body-Diode Characteristics

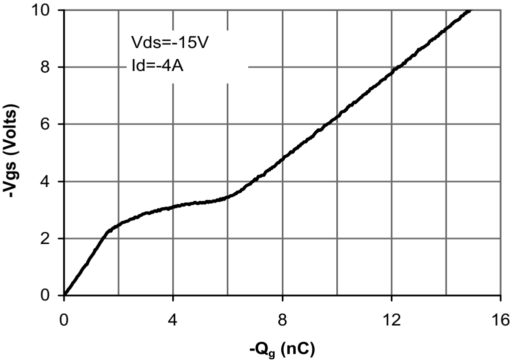


Figure 7: Gate-Charge Characteristics

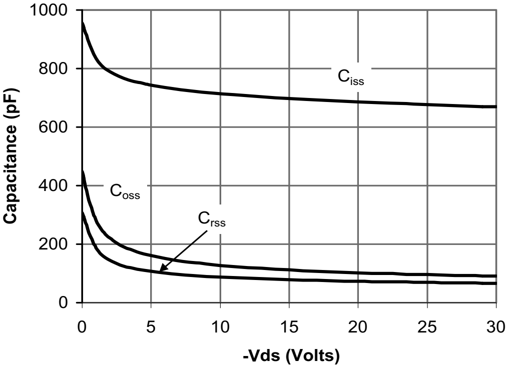


Figure 8: Capacitance Characteristics

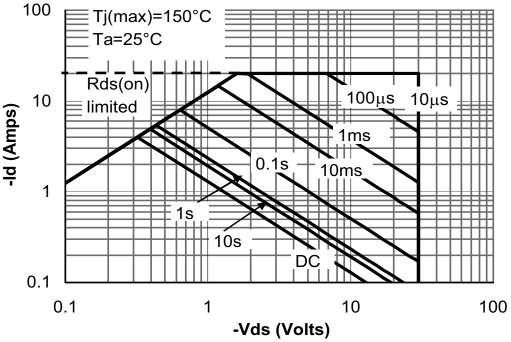


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

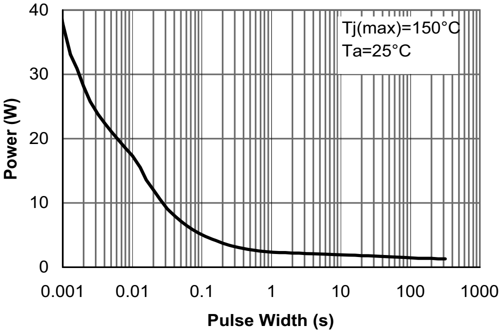


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

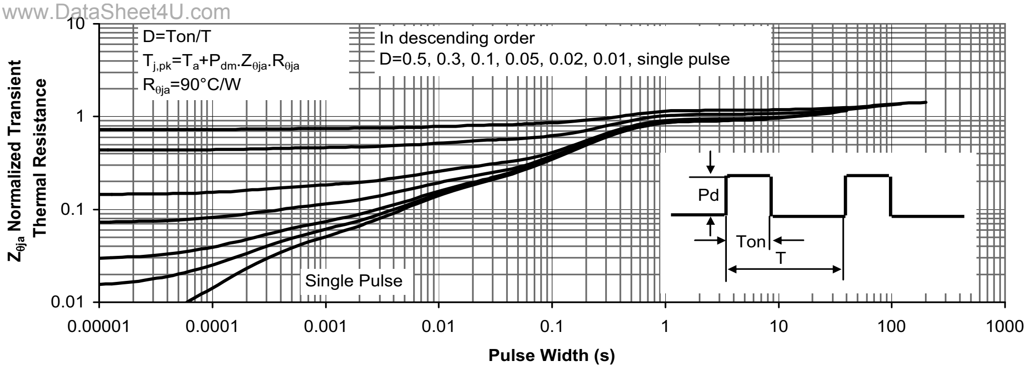


Figure 11: Normalized Maximum Transient Thermal Impedance