Single P-channel MOSFET

ELM17415GA-S

■General description

ELM17415GA-S uses advanced trench technology to provide excellent Rds(on), low gate charge and operation with gate voltages as low as 2.5V and internal ESD protection.

■Features

- Vds=-20V
- Id=-2A (Vgs=-10V)
- Rds(on) < 100mΩ (Vgs=-10V)
- Rds(on) < 125mΩ (Vgs=-4.5V)
- Rds(on) < 170mΩ (Vgs=-2.5V)
- ESD Rating : 2000V HBM

■Maximum absolute ratings

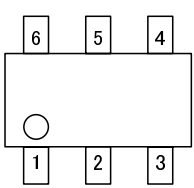
Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		Vds	-20	V	
Gate-source voltage		Vgs	±12	V	
Continuous drain current	Ta=25℃	Id	-2.0	A	1
	Ta=70℃		-1.6		
Pulsed drain current		Idm	-8	A	2
Power dissipation	Ta=25℃	Pd	0.625	W	1
	Ta=70℃		0.400		
Junction and storage temperature range		Tj, Tstg	-55 to 150	℃	

■Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	t≤10s	Rθja	160	200	℃/W	1
Maximum junction-to-ambient	Steady-state		180	220	℃/W	
Maximum junction-to-lead	Steady-state	Rθjl	130	160	℃/W	3

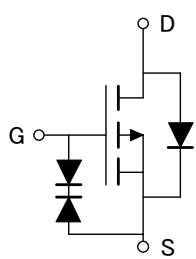
■Pin configuration

SC-70-6 (TOP VIEW)



Pin No.	Pin name
1	DRAIN
2	DRAIN
3	GATE
4	SOURCE
5	DRAIN
6	DRAIN

■Circuit



■Electrical characteristics

Ta=25℃

Parameter	Symbol	Condition		Min.	Typ.	Max.	Unit
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Id=-250μA, Vgs=0V		-20			V
Zero gate voltage drain current	Idss	Vds=-16V, Vgs=0V				-0.5	μA
			Tj=55℃			-2.5	
Gate-body leakage current	Igss	Vds=0V, Vgs=±10V				±1	μA
		Vds=0V, Vgs=±12V				±10	μA
Gate threshold voltage	Vgs(th)	Vds=Vgs, Id=-250μA		-0.7	-0.9	-1.4	V
On state drain current	Id(on)	Vgs=-4.5V, Vds=-5V		-15			A
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-2A			80	100	mΩ
			Tj=125℃		115		
		Vgs=-4.5V, Id=-1.3A			98	125	mΩ
		Vgs=-2.5V, Id=-1A			130	170	mΩ
Forward transconductance	Gfs	Vds=-5V, Id=-2A			5		S
Diode forward voltage	Vsd	Is=-1A, Vgs=0V			-0.84	-0.95	V
Max. body-diode continuous current	Is					-0.6	A
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vgs=0V, Vds=-10V, f=1MHz			512	620	pF
Output capacitance	Coss				77		pF
Reverse transfer capacitance	Crss				62		pF
Gate resistance	Rg	Vgs=0V, Vds=0V, f=1MHz			9.2	13.0	Ω
SWITCHING PARAMETERS							
Total gate charge	Qg	Vgs=-4.5V, Vds=-10V, Id=-2A			4.9	6.0	nC
Gate-source charge	Qgs				3.5		nC
Gate-drain charge	Qgd				3.7		nC
Turn-on delay time	td(on)	Vgs=-4.5V, Vds=-10V, Rl=5Ω, Rgen=3Ω			11	13	ns
Turn-on rise time	tr				8	10	ns
Turn-off delay time	td(off)				34	41	ns
Turn-off fall time	tf				12	15	ns
Body diode reverse recovery time	trr	If=-2A, dI/dt=100A/μs			13	17	ns
Body diode reverse recovery charge	Qrr	If=-2A, dI/dt=100A/μs			4	6	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℃. 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 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

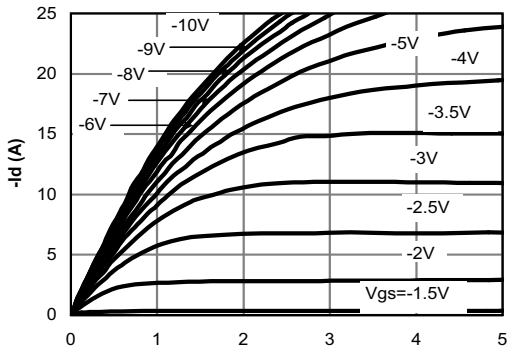


Fig 1: On-Region Characteristics

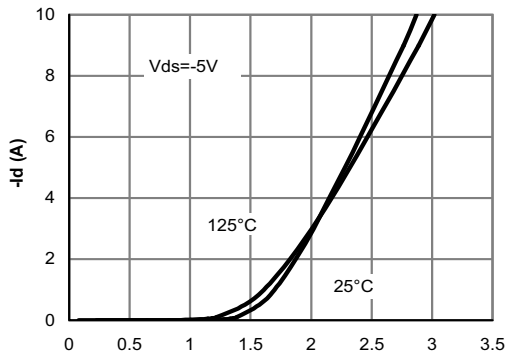


Figure 2: Transfer Characteristics

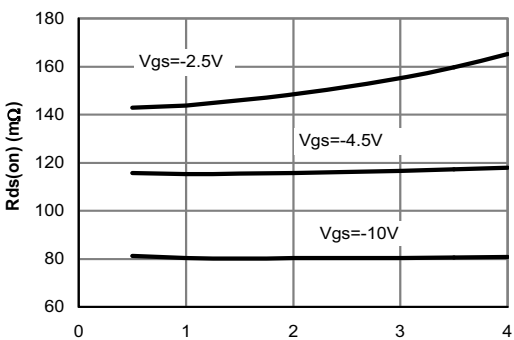


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

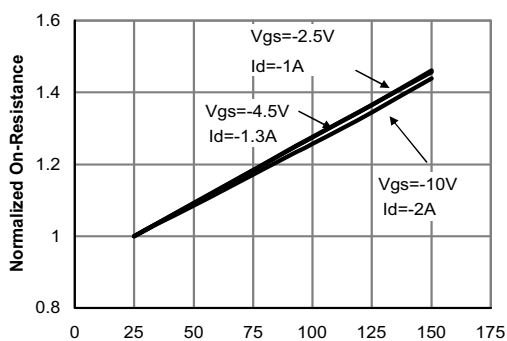


Figure 4: On-Resistance vs. Junction Temperature

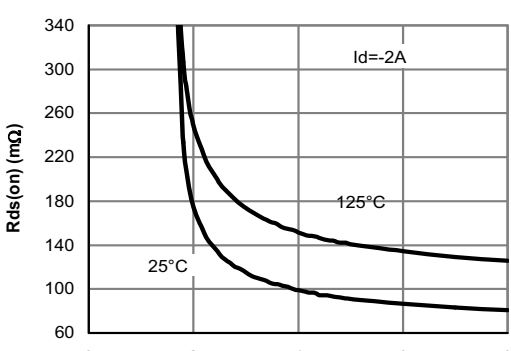


Figure 5: On-Resistance vs. Gate-Source Voltage

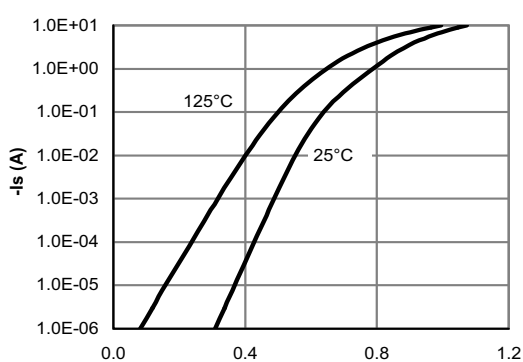


Figure 6: Body-Diode Characteristics

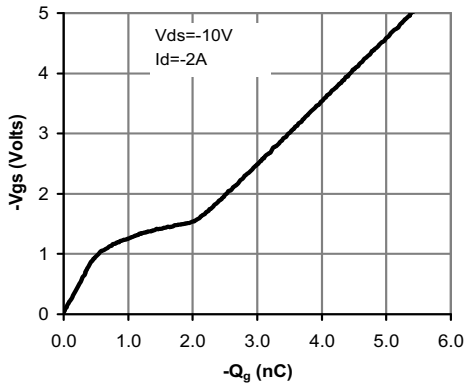


Figure 7: Gate-Charge Characteristics

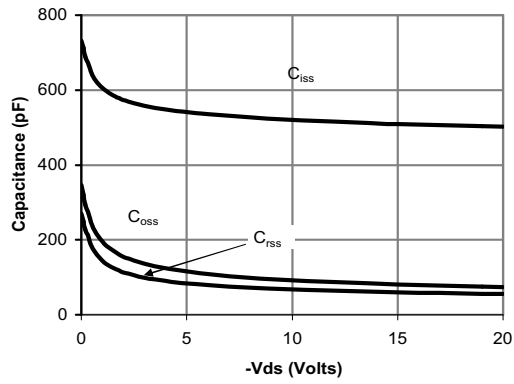


Figure 8: Capacitance Characteristics

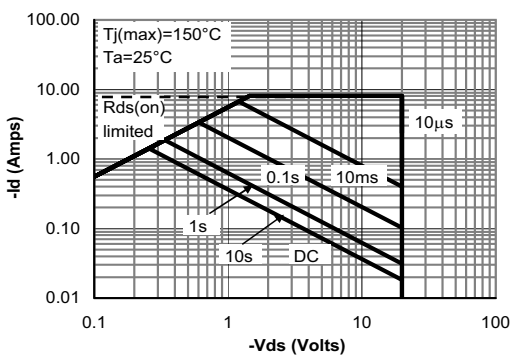


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

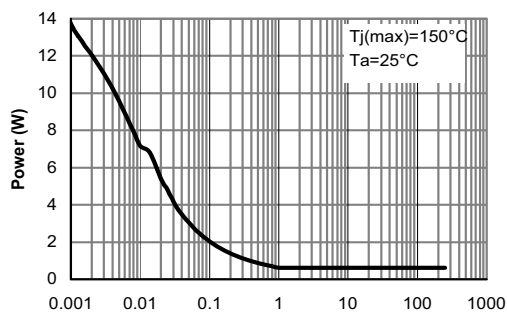


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

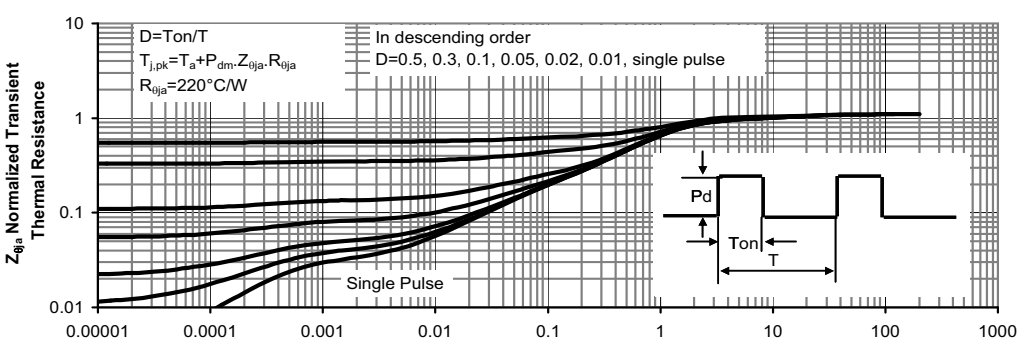


Figure 11: Normalized Maximum Transient Thermal Impedance