

Single P-channel MOSFET

ELM17415GA-S

General description

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

Features

- $V_{ds} = -20V$
- $I_d = -2A$ ($V_{gs} = -10V$)
- $R_{ds(on)} < 100m\Omega$ ($V_{gs} = -10V$)
- $R_{ds(on)} < 125m\Omega$ ($V_{gs} = -4.5V$)
- $R_{ds(on)} < 170m\Omega$ ($V_{gs} = -2.5V$)
- ESD Rating : 2000V HBM

Maximum absolute ratings

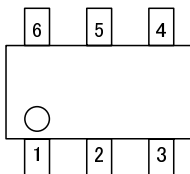
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	-20	V		
Gate-source voltage	V_{gs}	± 12	V		
Continuous drain current	I_d	$T_a = 25^\circ C$	-2.0	A	1
		$T_a = 70^\circ C$	-1.6		
Pulsed drain current	I_{dm}	-8	A	2	
Power dissipation	P_d	$T_a = 25^\circ C$	0.625	W	1
		$T_a = 70^\circ C$	0.400		
Junction and storage temperature range	T_j, T_{stg}	-55 to 150	$^\circ C$		

Thermal characteristics

Parameter		Symbol	Typ.	Max.	Unit	Note
Maximum junction-to-ambient	$t \leq 10s$	$R\theta_{ja}$	160	200	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		180	220	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	130	160	$^\circ C/W$	3

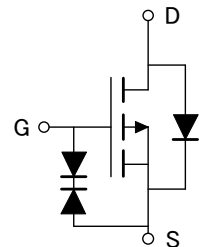
Pin configuration

SC-70-6 (TOP VIEW)



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

Circuit



Single P-channel MOSFET

ELM17415GA-S

Electrical characteristics

T_a=25°C

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit
STATIC PARAMETERS						
Drain-source breakdown voltage	BV _{dss}	I _d =-250 μA, V _{gs} =0V	-20			V
Zero gate voltage drain current	I _{dss}	V _{ds} =-16V			-0.5	μA
		V _{gs} =0V	T _j =55°C		-2.5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±10V			±1	μA
		V _{ds} =0V, V _{gs} =±12V			±10	μA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =-250 μA	-0.7	-0.9	-1.4	V
On state drain current	I _{d(on)}	V _{gs} =-4.5V, V _{ds} =-5V	-15			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V		80	100	mΩ
		I _d =-2A	T _j =125°C	115		
		V _{gs} =-4.5V, I _d =-1.3A		98	125	mΩ
		V _{gs} =-2.5V, I _d =-1A		130	170	mΩ
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-2A		5		S
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V		-0.84	-0.95	V
Max. body-diode continuous current	I _s				-0.6	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-10V, f=1MHz		512	620	pF
Output capacitance	C _{oss}		77		pF	
Reverse transfer capacitance	C _{rss}		62		pF	
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		9.2	13.0	Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g	V _{gs} =-4.5V, V _{ds} =-10V I _d =-2A		4.9	6.0	nC
Gate-source charge	Q _{gs}		3.5		nC	
Gate-drain charge	Q _{gd}		3.7		nC	
Turn-on delay time	t _{d(on)}	V _{gs} =-4.5V, V _{ds} =-10V R _l =5 Ω, R _{gen} =3 Ω		11	13	ns
Turn-on rise time	t _r		8	10	ns	
Turn-off delay time	t _{d(off)}		34	41	ns	
Turn-off fall time	t _f		12	15	ns	
Body diode reverse recovery time	t _{rr}		I _f =-2A, dI/dt=100A/μs		13	17
Body diode reverse recovery charge	Q _{rr}	I _f =-2A, dI/dt=100A/μs		4	6	nC

NOTE :

1. The value of R_{θja} is measured with the device mounted on 1in² FR-4 board of 2oz. Copper, in still air environment with T_a=25°C. The value in any given applications depends on the user's specific board design. The current rating is based on the t ≤ 10s thermal resistance rating.
2. Repetitive rating, pulse width limited by junction temperature.
3. The R_{θja} is the sum of the thermal impedance from junction to lead R_{θjl} and lead to ambient.
4. The static characteristics in Figures 1 to 6 are obtained using 80 μs 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 T_a=25°C. The SOA curve provides a single pulse rating.

Single P-channel MOSFET

ELM17415GA-S

Typical electrical and thermal characteristics

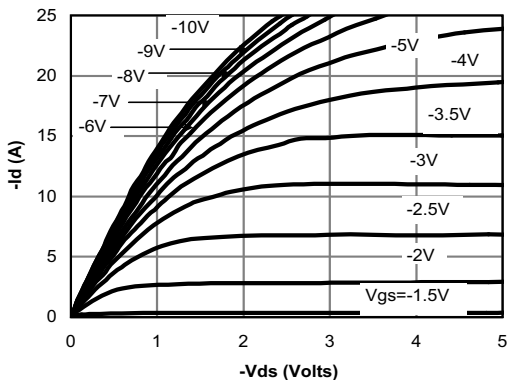


Figure 1: On-Region Characteristics

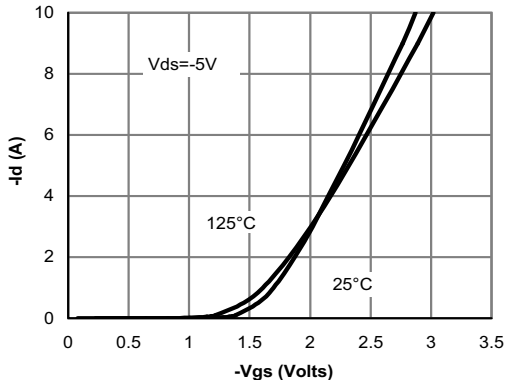


Figure 2: Transfer Characteristics

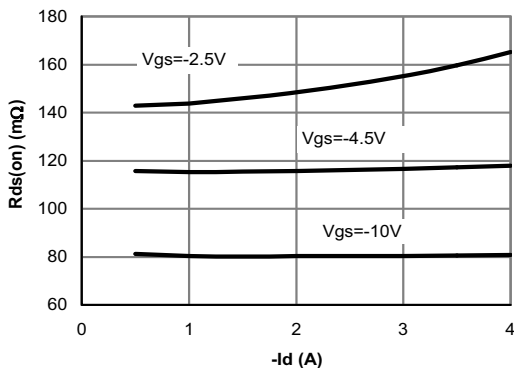


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

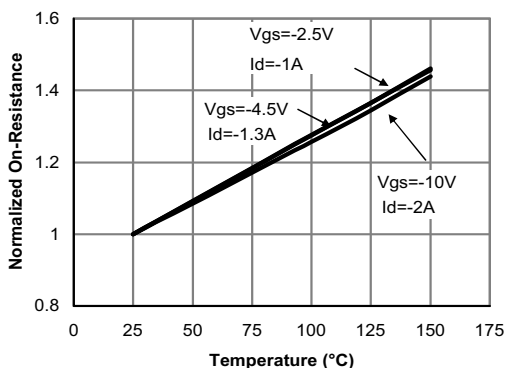


Figure 4: On-Resistance vs. Junction Temperature

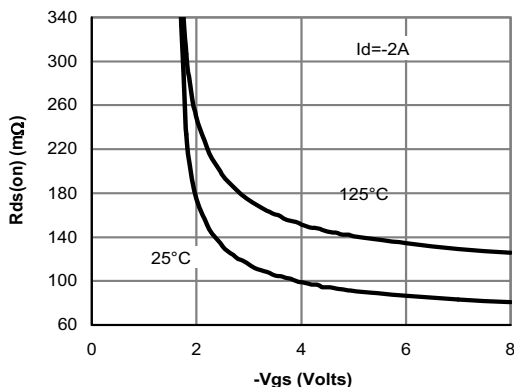


Figure 5: On-Resistance vs. Gate-Source Voltage

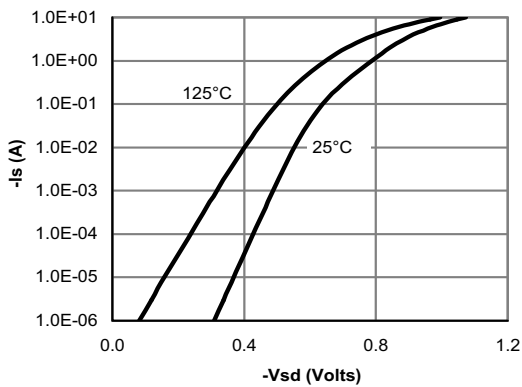


Figure 6: Body-Diode Characteristics

Single P-channel MOSFET

ELM17415GA-S

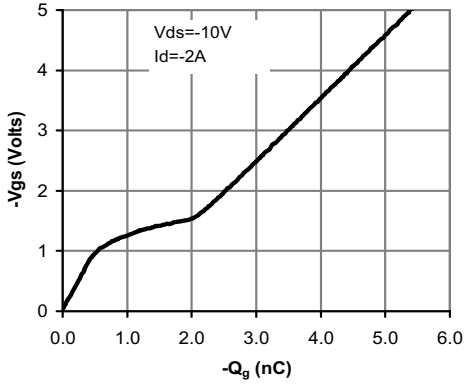


Figure 7: Gate-Charge Characteristics

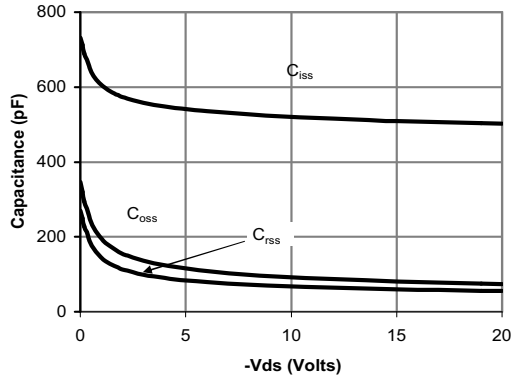


Figure 8: Capacitance Characteristics

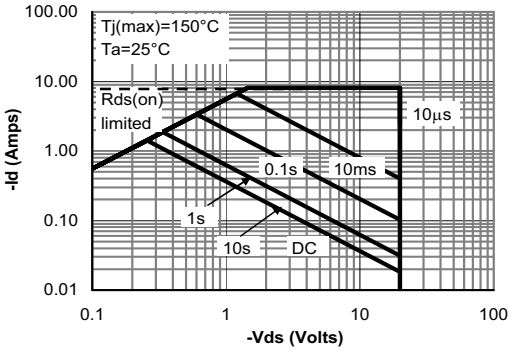


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

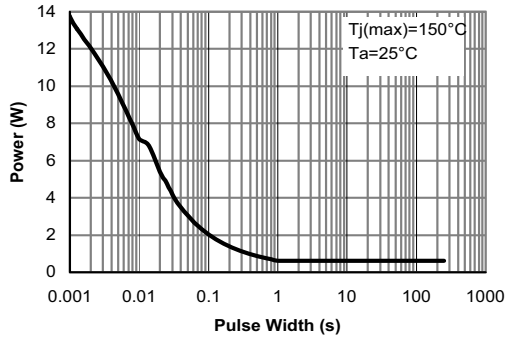


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

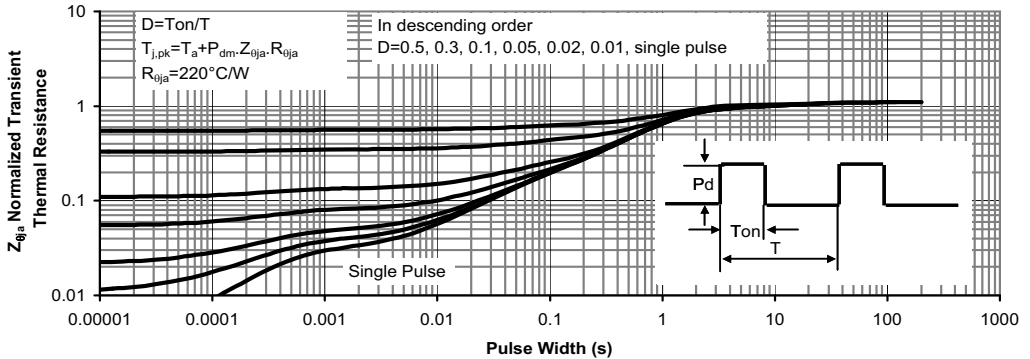


Figure 11: Normalized Maximum Transient Thermal Impedance