

Single N-channel MOSFET

ELM17412GA-S

General description

ELM17412GA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and operation with gate voltages as low as 2.5V.

Features

- $V_{ds}=30V$
- $I_d=2.1A$ ($V_{gs}=10V$)
- $R_{ds(on)} < 90m\Omega$ ($V_{gs}=10V$)
- $R_{ds(on)} < 100m\Omega$ ($V_{gs}=4.5V$)
- $R_{ds(on)} < 160m\Omega$ ($V_{gs}=2.5V$)

Maximum absolute ratings

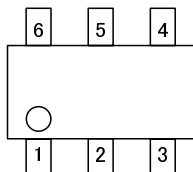
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	30	V		
Gate-source voltage	V_{gs}	± 12	V		
Continuous drain current	I_d	$T_a=25^\circ C$	2.1	A	1
		$T_a=70^\circ C$	1.7		
Pulsed drain current	I_{dm}	10	A	2	
Power dissipation	P_d	$T_a=25^\circ C$	0.625	W	1
		$T_a=70^\circ C$	0.400		
Junction 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	$t \leq 10s$	$R\theta_{ja}$	175	200	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		200	250	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	130	160	$^\circ C/W$	3

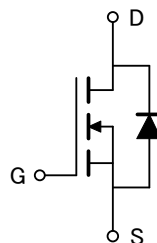
Pin configuration

SC-70-6 (TOP VIEW)



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

Circuit



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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	30			V
Zero gate voltage drain current	I _{dss}	V _{ds} =16V			1	μA
		V _{gs} =0V		T _j =55°C	5	
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±12V			100	nA
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =250 μA	1.0	1.5	1.8	V
On state drain current	I _{d(on)}	V _{gs} =4.5V, V _{ds} =5V	10			A
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =10V		69	90	mΩ
		I _d =2.1A		108	130	
		T _j =125°C				
		V _{gs} =4.5V, I _d =1.3A		78	100	mΩ
		V _{gs} =2.5V, I _d =1A		130	160	mΩ
Forward transconductance	G _{fs}	V _{ds} =5V, I _d =2.1A		8.5		S
Diode forward voltage	V _{sd}	I _s =1A, V _{gs} =0V		0.8	1.0	V
Max. body-diode continuous current	I _s				2.5	A
DYNAMIC PARAMETERS						
Input capacitance	C _{iss}			226	270	pF
Output capacitance	C _{oss}	V _{gs} =0V, V _{ds} =15V, f=1MHz		39		pF
Reverse transfer capacitance	C _{rss}			29		pF
Gate resistance	R _g	V _{gs} =0V, V _{ds} =0V, f=1MHz		1.4	1.7	Ω
SWITCHING PARAMETERS						
Total gate charge	Q _g			3.0	3.6	nC
Gate-source charge	Q _{gs}	V _{gs} =4.5V, V _{ds} =15V, I _d =2.1A		0.4		nC
Gate-drain charge	Q _{gd}			1.2		nC
Turn-on delay time	t _{d(on)}			2.8	4.0	ns
Turn-on rise time	t _r	V _{gs} =5V, V _{ds} =15V		2.1	3.0	ns
Turn-off delay time	t _{d(off)}	R _l =7.1 Ω, R _{gen} =6 Ω		17.4	21.0	ns
Turn-off fall time	t _f			2.1	3.0	ns
Body diode reverse recovery time	t _{rr}	I _f =2.1A, dI/dt=100A/μs		9.1	11.0	ns
Body diode reverse recovery charge	Q _{rr}	I _f =2.1A, dI/dt=100A/μs		3.4	4.0	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 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 T_a=25°C. The SOA curve provides a single pulse rating.

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Typical electrical and thermal characteristics

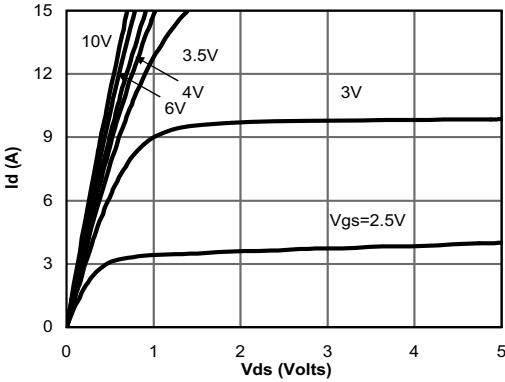


Figure 1: On-Region Characteristics

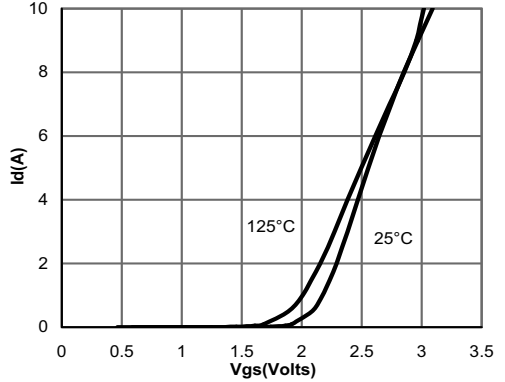


Figure 2: Transfer Characteristics

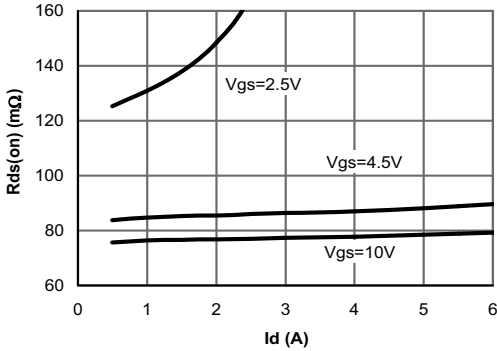


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

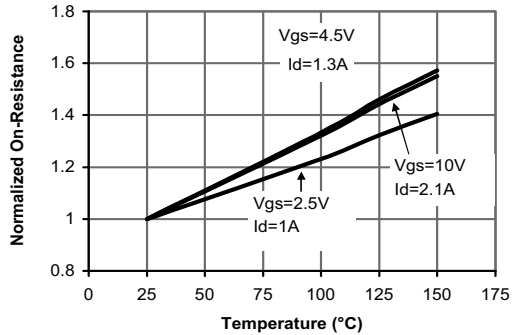


Figure 4: On-Resistance vs. Junction Temperature

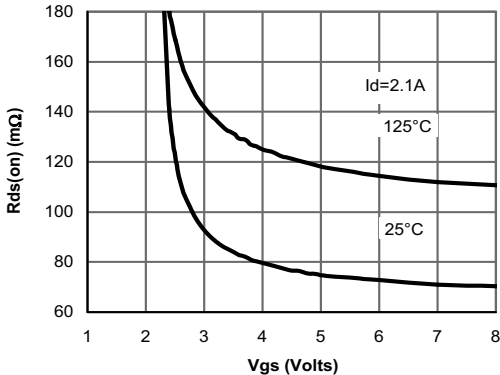


Figure 5: On-Resistance vs. Gate-Source Voltage

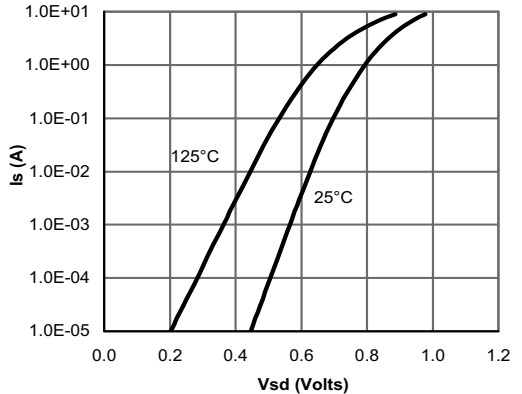


Figure 6: Body-Diode Characteristics

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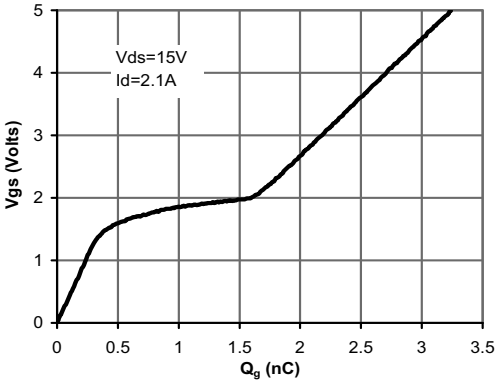


Figure 7: Gate-Charge Characteristics

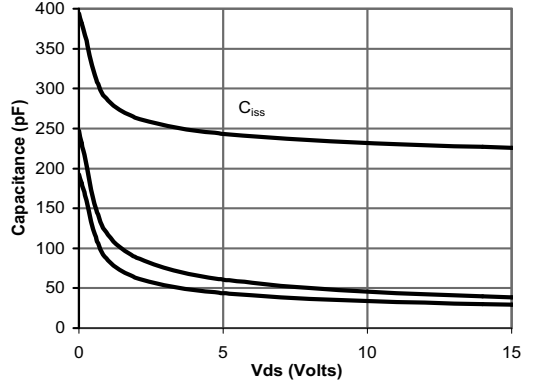


Figure 8: Capacitance Characteristics

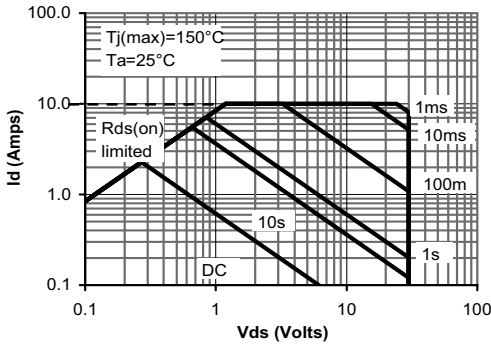


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

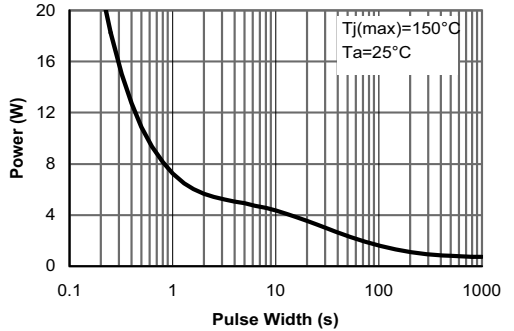


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

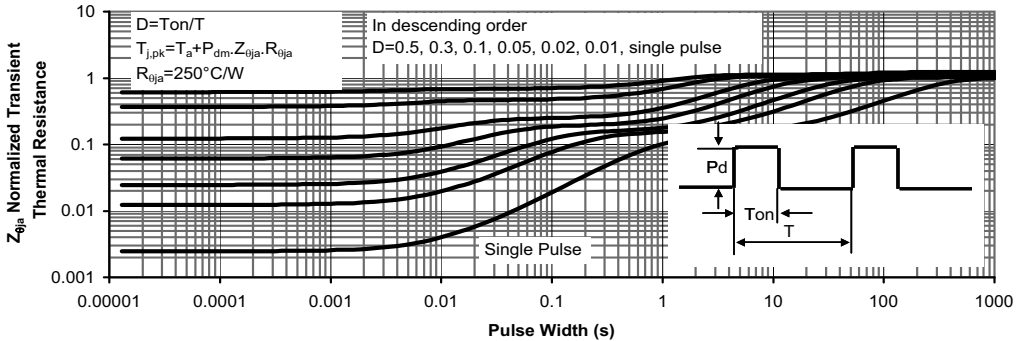


Figure 11: Normalized Maximum Transient Thermal Impedance