

Single P-channel MOSFET

ELM17413FA-S

General description

ELM17413FA-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

- $V_{ds} = -20V$
- $I_d = -1.4A$ ($V_{gs} = -10V$)
- $R_{ds(on)} < 113m\Omega$ ($V_{gs} = -10V$)
- $R_{ds(on)} < 135m\Omega$ ($V_{gs} = -4.5V$)
- $R_{ds(on)} < 180m\Omega$ ($V_{gs} = -2.5V$)
- ESD Rating : 2000V HBM

Maximum absolute ratings

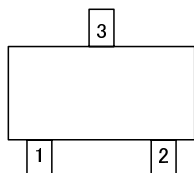
Parameter	Symbol	Limit	Unit	Note	
Drain-source voltage	V_{ds}	-20	V		
Gate-source voltage	V_{gs}	± 12	V		
Continuous drain current	I_d	$T_a = 25^\circ C$	-1.4	A	1
		$T_a = 70^\circ C$	-1.2		
Pulsed drain current	I_{dm}	-3	A	2	
Power dissipation	P_d	$T_a = 25^\circ C$	0.35	W	1
		$T_a = 70^\circ C$	0.22		
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	$t \leq 10s$	$R\theta_{ja}$	300	360	$^\circ C/W$	1
Maximum junction-to-ambient	Steady-state		350	425	$^\circ C/W$	
Maximum junction-to-lead	Steady-state	$R\theta_{jl}$	280	320	$^\circ C/W$	3

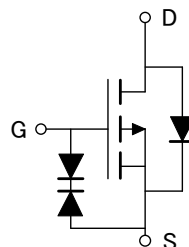
Pin configuration

SC-70 (TOP VIEW)



Pin No.	Pin name
1	GATE
2	SOURCE
3	DRAIN

Circuit



Single P-channel MOSFET

ELM17413FA-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		94	113	mΩ
		I _d =-1.4A	T _j =125°C	130	160	
		V _{gs} =-4.5V, I _d =-1.3A		111	135	mΩ
		V _{gs} =-2.5V, I _d =-1.1A		150	180	mΩ
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-1.4A		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}			512	620	pF
Output capacitance	C _{oss}	V _{gs} =0V, V _{ds} =-10V, f=1MHz		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		4.9	6.0	nC
Gate-source charge	Q _{gs}	I _d =-1.4A		3.5		nC
Gate-drain charge	Q _{gd}			3.7		nC
Turn-on delay time	t _{d(on)}			11	13	ns
Turn-on rise time	t _r	V _{gs} =-4.5V, V _{ds} =-10V		8	10	ns
Turn-off delay time	t _{d(off)}	R _l =7.1 Ω, R _{gen} =3 Ω		34	41	ns
Turn-off fall time	t _f			12	15	ns
Body diode reverse recovery time	t _{rr}	I _f =-1.4A, dI/dt=100A/μs		12.9	16.0	ns
Body diode reverse recovery charge	Q _{rr}	I _f =-1.4A, dI/dt=100A/μs		3.9	5.0	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.

Single P-channel MOSFET

ELM17413FA-S

Typical electrical and thermal characteristics

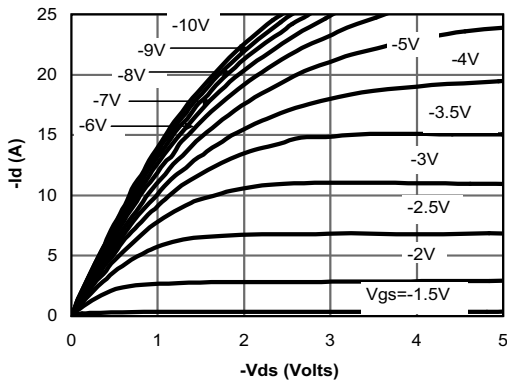


Fig 1: On-Region Characteristics

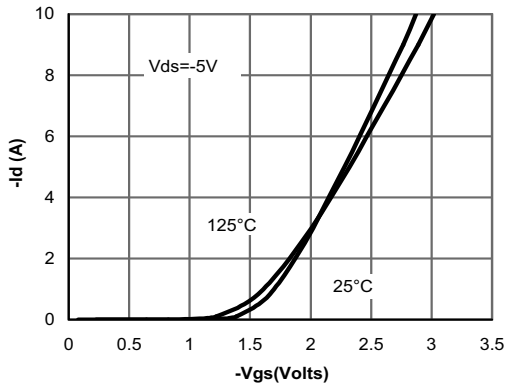


Figure 2: Transfer Characteristics

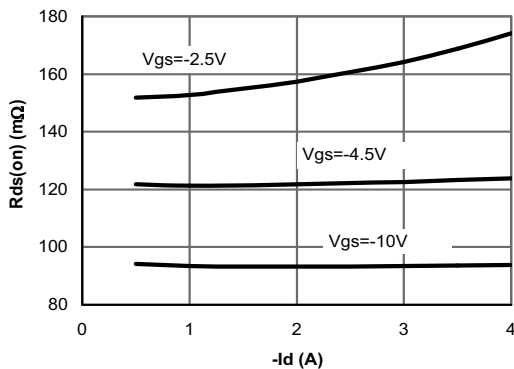


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

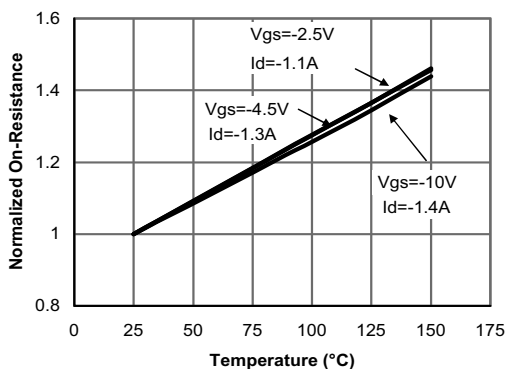


Figure 4: On-Resistance vs. Junction Temperature

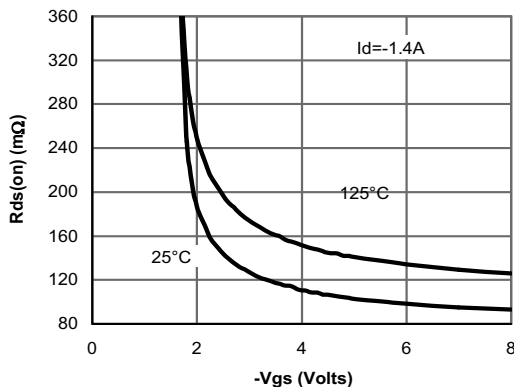


Figure 5: On-Resistance vs. Gate-Source Voltage

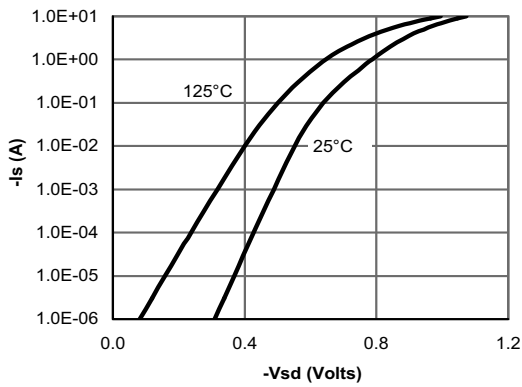


Figure 6: Body-Diode Characteristics

Single P-channel MOSFET

ELM17413FA-S

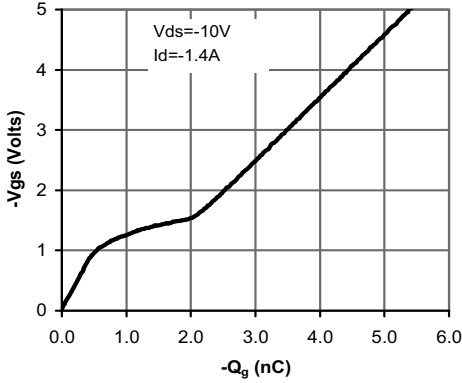


Figure 7: Gate-Charge Characteristics

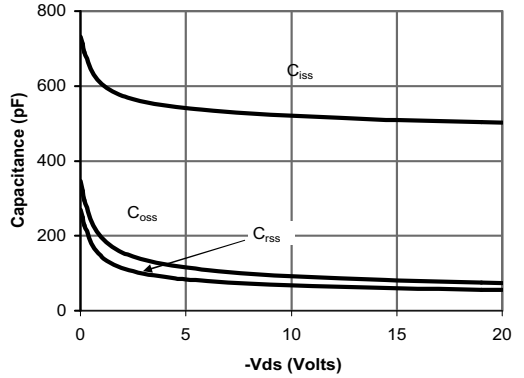


Figure 8: Capacitance Characteristics

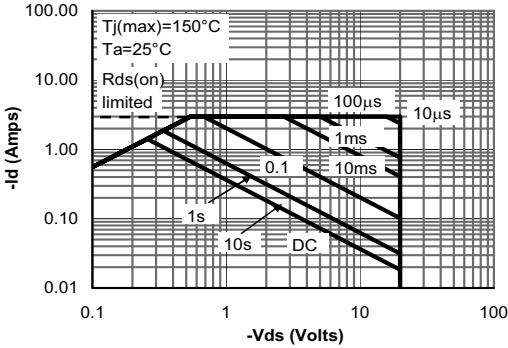


Figure 9: Maximum Forward Biased Safe Operating Area (Note E)

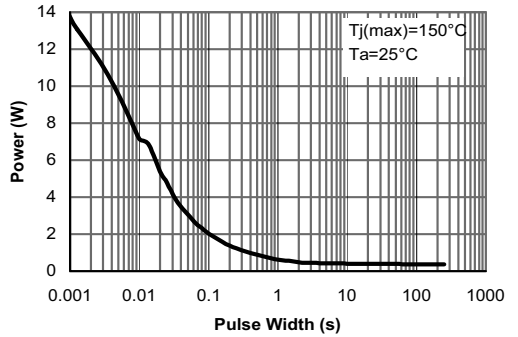


Figure 10: Single Pulse Power Rating Junction-to-Ambient (Note E)

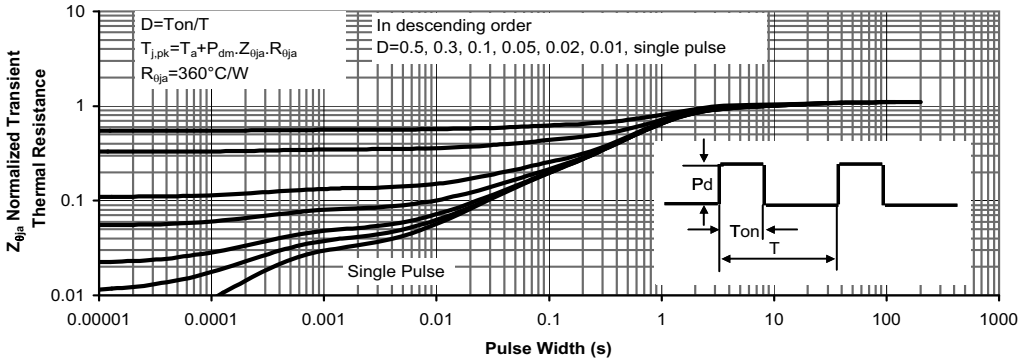


Figure 11: Normalized Maximum Transient Thermal Impedance