

Single P-channel MOSFET

ELM4PK3101FRA-S

<http://www.elm-tech.com>

■ General description

ELM4PK3101FPA-S uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■ Features

- $V_{ds} = -30V$
- $I_d = -4A$
- $R_{ds(on)} = 52m\Omega$ ($V_{gs} = -10V$)
- $R_{ds(on)} = 90m\Omega$ ($V_{gs} = -4.5V$)

■ Maximum absolute ratings

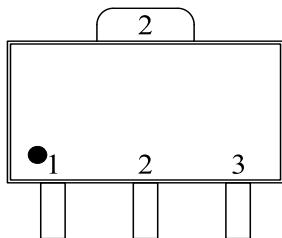
Parameter	Symbol	Rating	Unit	Note	
		Steady state			
Drain-source voltage	V_{ds}	-30	V		
Gate-source voltage	V_{gs}	± 20	V		
Continuous drain current	I_d	$T_a = 25^\circ C$	-4	A	
		$T_a = 70^\circ C$	-3		
Pulsed drain current	I_{dm}	-20	A	2	
Power dissipation	P_d	$T_a = 25^\circ C$	1.32	W	3
		$T_a = 70^\circ C$	0.84		
Storage temperature range	T_{stg}	-55 to +150	$^\circ C$		
Operating junction temperature range	T_j	-55 to +150	$^\circ C$		

■ Thermal characteristics

Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient (Steady state)	$R_{\theta ja}$	-	95	$^\circ C/W$	1
Thermal Resistance Junction-Case	$R_{\theta jc}$	-	30	$^\circ C/W$	1

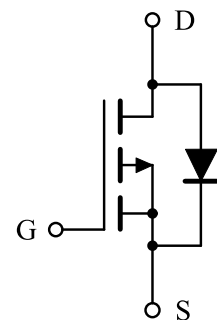
■ Pin configuration

SOT-89(TOP VIEW)



Pin No.	Pin name
1	GATE
2	DRAIN
3	SOURCE

■ Circuit



Single P-channel MOSFET

ELM4PK3101FRA-S

<http://www.elm-tech.com>

■ Electrical characteristics

T_j=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note	
STATIC PARAMETERS								
Drain-source breakdown voltage	BV _{dss}	V _{gs} =0V, I _d =-250μA	-30	-	-	V		
Zero gate voltage drain current	I _{dss}	V _{ds} =-24V, V _{gs} =0V	-	-	-1	μA		
		V _{ds} =-24V, V _{gs} =0V, T _j =55°C	-	-	-5			
Gate-body leakage current	I _{gss}	V _{ds} =0V, V _{gs} =±20V	-	-	±100	nA		
Gate threshold voltage	V _{gs(th)}	V _{ds} =V _{gs} , I _d =-250μA	-1.2	-	-2.5	V		
Static drain-source on-resistance	R _{ds(on)}	V _{gs} =-10V, I _d =-4A	-	-	52	mΩ	2	
		V _{gs} =-4.5V, I _d =-2A	-	-	90			
Forward transconductance	G _{fs}	V _{ds} =-5V, I _d =-4A	-	11	-	S		
Diode forward voltage	V _{sd}	I _s =-1A, V _{gs} =0V	-	-	-1.2	V	2	
Max. body-diode continuous current	I _s	V _{gs} =V _{ds} =0V, Force current	-	-	-4.5	A	1, 4	
Pulsed source current	I _{sm}		-	-	-23	A	2, 4	
DYNAMIC PARAMETERS								
Input capacitance	C _{iss}	V _{gs} =0V, V _{ds} =-15V, f=1MHz	-	583	-	pF		
Output capacitance	C _{oss}		-	100	-	pF		
Reverse transfer capacitance	C _{rss}		-	80	-	pF		
SWITCHING PARAMETERS								
Total gate charge (-4.5)	Q _g	V _{gs} =-4.5V, V _{ds} =-15V I _d =-4A	-	6.4	-	nC		
Gate-source charge	Q _{gs}		-	2.3	-	nC		
Gate-drain charge	Q _{gd}		-	1.9	-	nC		
Turn-on delay time	t _{d(on)}	V _{gs} =-10V, V _{ds} =-15V I _d =-4A, R _{gen} =3.3Ω	-	2.8	-	ns		
Turn-on rise time	t _r		-	8.4	-	ns		
Turn-off delay time	t _{d(off)}		-	39.0	-	ns		
Turn-off fall time	t _f		-	6.0	-	ns		
Reverse recovery time	t _{rr}		I _f =-4A, dI/dt=100A/μs	-	7.8	-	nS	
Reverse recovery charge	Q _{rr}			-	2.5	-	nC	

NOTE :

1. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.
2. The data tested by pulsed, pulse width ≤ 300μs and duty cycle ≤ 2%.
3. The power dissipation is limited by 150°C junction temperature.
4. The data is theoretically the same as I_d and I_{dm}, in real applications, should be limited by total power dissipation.

Single P-channel MOSFET

ELM4PK3101FRA-S

<http://www.elm-tech.com>

■ Typical electrical and thermal characteristics

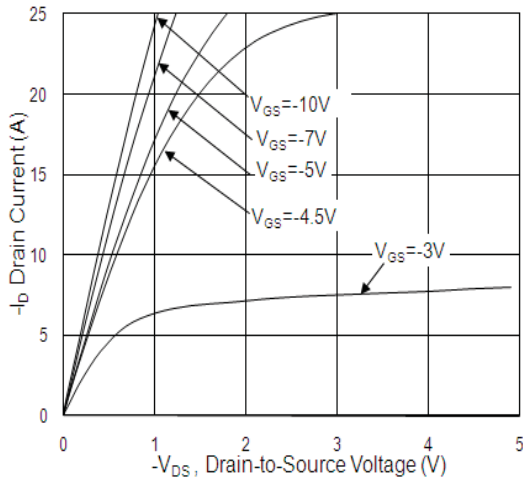


Fig.1 Typical Output Characteristics

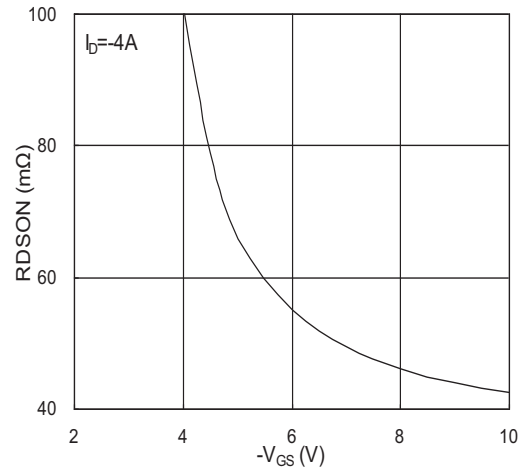


Fig.2 On-Resistance vs. Gate-Source

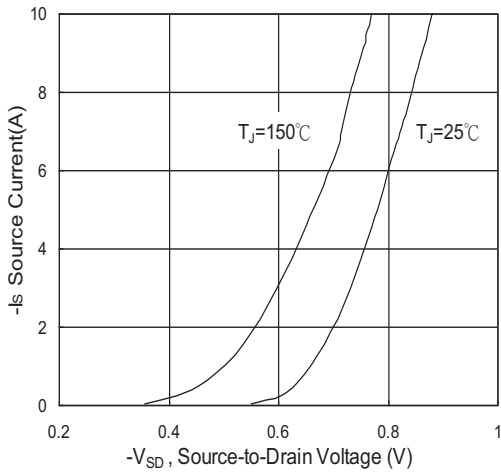


Fig.3 Forward Characteristics of Reverse

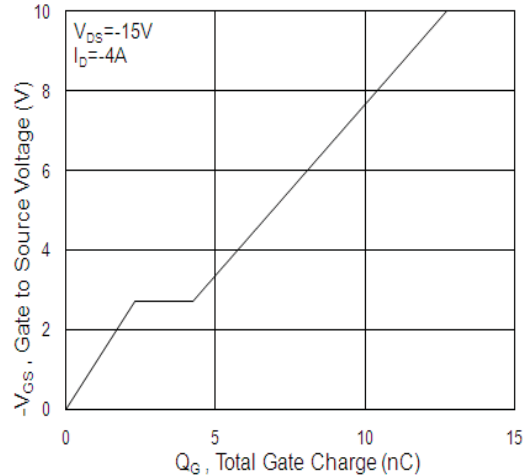


Fig.4 Gate-Charge Characteristics

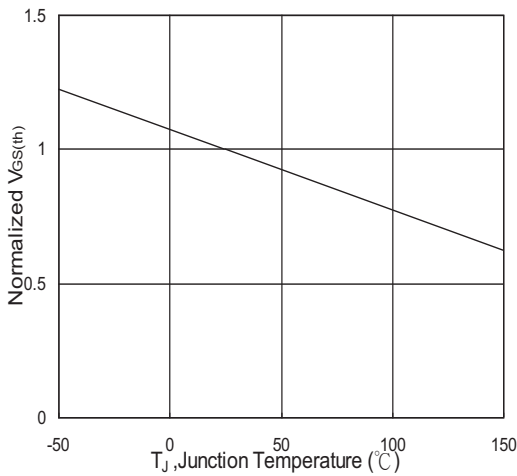


Fig.5 Normalized $V_{GS(th)}$ vs. T_J

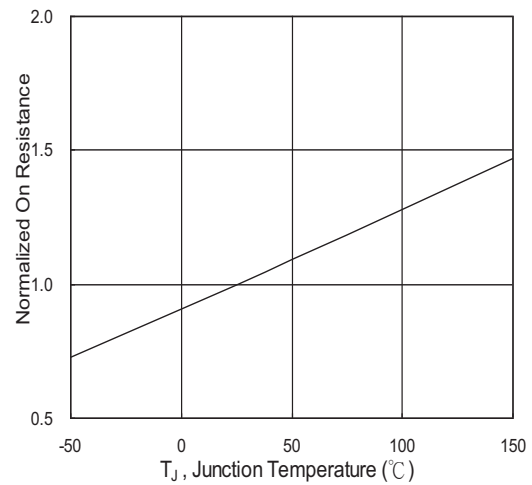


Fig.6 Normalized $R_{DS(on)}$ vs. T_J

Single P-channel MOSFET

ELM4PK3101FRA-S

<http://www.elm-tech.com>

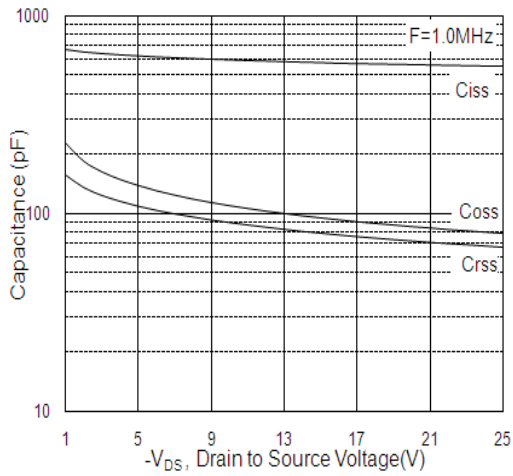


Fig.7 Capacitance

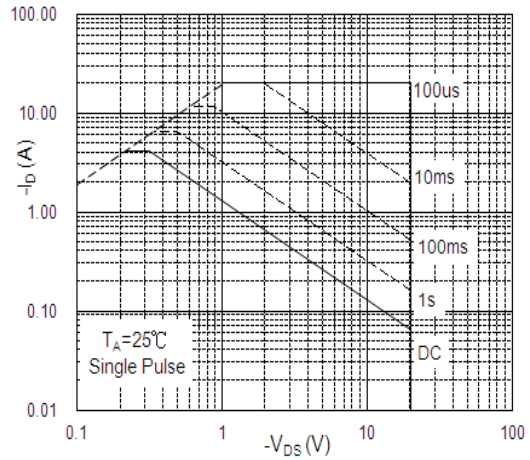


Fig.8 Safe Operating Area

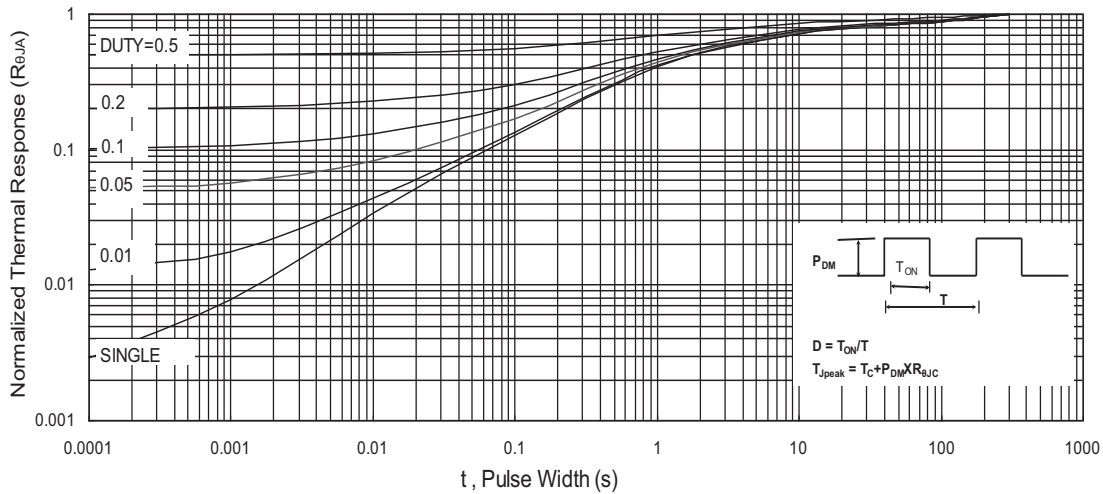


Fig.9 Normalized Maximum Transient Thermal Impedance

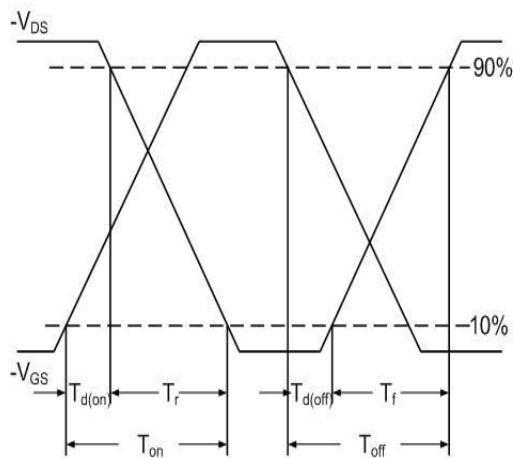


Fig.10 Switching Time Waveform

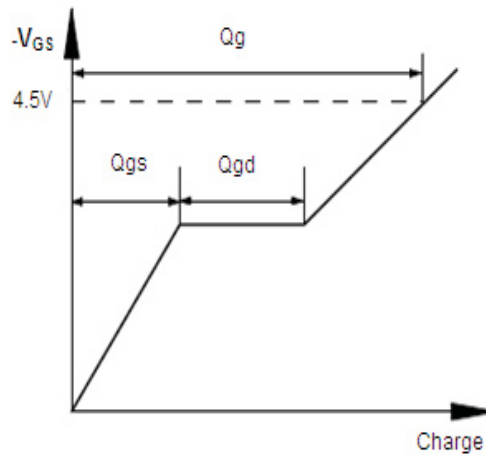


Fig.11 Gate Charge Waveform