

Single P-channel MOSFET

ELM4P6105FDA-N

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

■General description

ELM4P6105FDA-N uses advanced trench technology to provide excellent $R_{ds(on)}$, low gate charge and low gate threshold voltage.

■Features

- $V_{ds}=-60V$
- $I_d=-29A$ ($V_{gs}=-10V$)
- $R_{ds(on)}=35m\Omega$ ($V_{gs}=-10V$)
- $R_{ds(on)}=55m\Omega$ ($V_{gs}=-4.5V$)

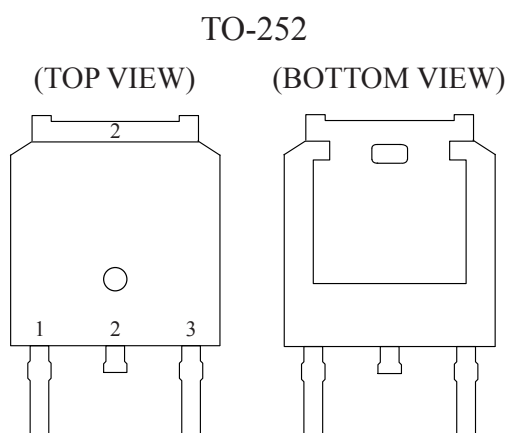
■Maximum absolute ratings

Parameter		Symbol	Limit	Unit	Note
Drain-source voltage		V_{ds}	-60	V	
Gate-source voltage		V_{gs}	± 20	V	
Continuous drain current ($V_{gs}=-10V$)	$T_c=25^\circ C$	I_d	-29.0	A	1
	$T_c=100^\circ C$		-18.5		
	$T_a=25^\circ C$		-6.2		
	$T_a=70^\circ C$		-5.0		
Pulsed drain current		I_{dm}	-58	A	2
Single pulse avalanche energy		E_{as}	64.8	mJ	3
Avalanche current		I_{as}	-36	A	
Total power dissipation	$T_c=25^\circ C$	P_d	45	W	4
	$T_a=25^\circ C$		2	W	
Storage temperature range		T_{stg}	-55 to 150	$^\circ C$	
Operating junction temperature range		T_j	-55 to 150	$^\circ C$	

■Thermal characteristics

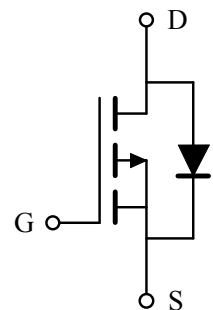
Parameter	Symbol	Typ.	Max.	Unit	Note
Thermal resistance junction-ambient	$R_{\theta ja}$	-	62.0	$^\circ C/W$	1
Thermal resistance junction-case	$R_{\theta jc}$	-	2.8	$^\circ C/W$	1

■Pin configuration



Pin No.	Pin name
1	GATE
2	DRAIN
3	SOURCE

■Circuit



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■Electrical characteristics

Tj=25°C. Unless otherwise noted.

Parameter	Symbol	Condition	Min.	Typ.	Max.	Unit	Note
STATIC PARAMETERS							
Drain-source breakdown voltage	BVdss	Vgs=0V, Id=-250μA	-60	-	-	V	
Static drain-source on-resistance	Rds(on)	Vgs=-10V, Id=-20A	-	30	35	mΩ	2
		Vgs=-4.5V, Id=-15A	-	38	55		
Gate threshold voltage	Vgs(th)	Vgs=Vds, Id=-250μA	-1.2	-1.6	-2.5	V	
Drain-source leakage current	Idss	Vds=-48V, Vgs=0V	-	-	-1	μA	
		Vds=-48V, Vgs=0V, Tj=55°C	-	-	-5		
Gate-source leakage current	Igss	Vgs=±20V, Vds=0V	-	-	±100	nA	
Forward transconductance	Gfs	Vds=-5V, Id=-20A	-	30	-	S	
Continuous source current	Is	Vgs=Vds=0V, Force current	-	-	-29	A	1, 5
Diode forward voltage	Vsd	Vgs=0V, Is=-1A	-	-	-1	V	2
DYNAMIC PARAMETERS							
Input capacitance	Ciss	Vds=-15V, Vgs=0V, f=1MHz	-	2217	-	pF	
Output capacitance	Coss		-	310	-	pF	
Reverse transfer capacitance	Crss		-	238	-	pF	
SWITCHING PARAMETERS							
Total gate charge (-4.5)	Qg	Vds=-15V, Vgs=-4.5V Id=-15A	-	24.0	-	nC	
Gate-source charge	Qgs		-	8.6	-	nC	
Gate-drain charge	Qgd		-	7.3	-	nC	
Turn-on delay time	td(on)	Vds=-15V, Vgs=-10V Rgen=3.3Ω, Id=-15A	-	9.0	-	ns	
Turn-on rise time	tr		-	70.7	-	ns	
Turn-off delay time	td(off)		-	59.8	-	ns	
Turn-off fall time	tf		-	20.4	-	ns	
Reverse recovery time	trr	If=-20A , dI/dt=100A/μs	-	30	-	nS	
Reverse recovery charge	Qrr		-	45	-	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 Eas data shows Max. rating . The test condition is Vdd=-25V, Vgs=-10V, L=0.1mH, Ias=-36A.
4. The power dissipation is limited by 150°C junction temperature.
5. The data is theoretically the same as Id and Idm, in real applications, should be limited by total power dissipation.

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■ Typical electrical and thermal characteristics

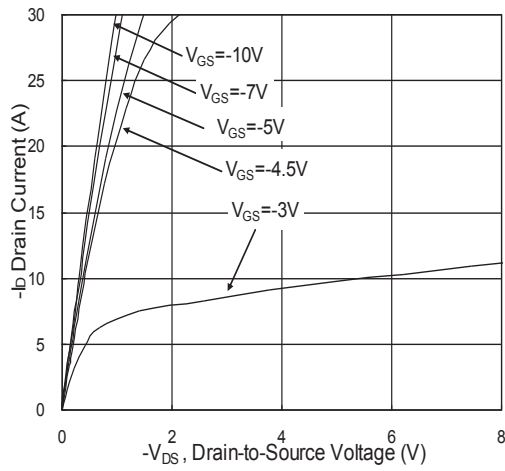


Fig.1 Typical Output Characteristics

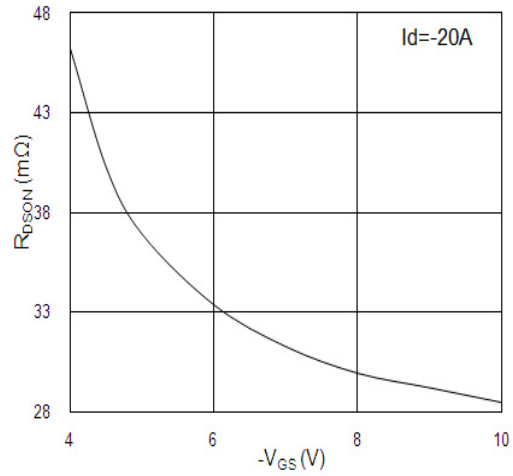


Fig.2 On-Resistance vs G-S Voltage

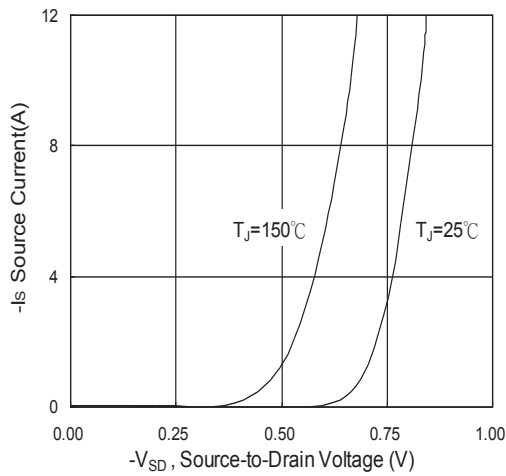


Fig.3 Source Drain Forward Characteristics

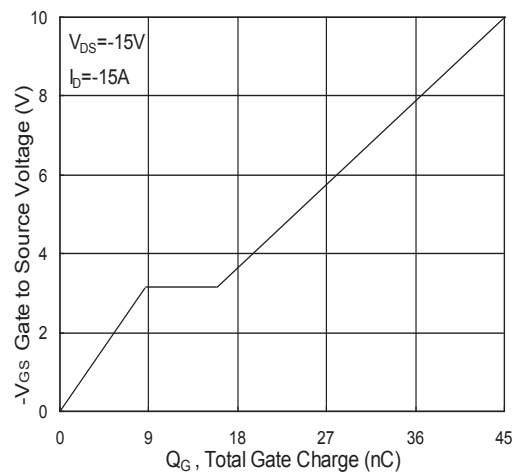


Fig.4 Gate-charge Characteristics

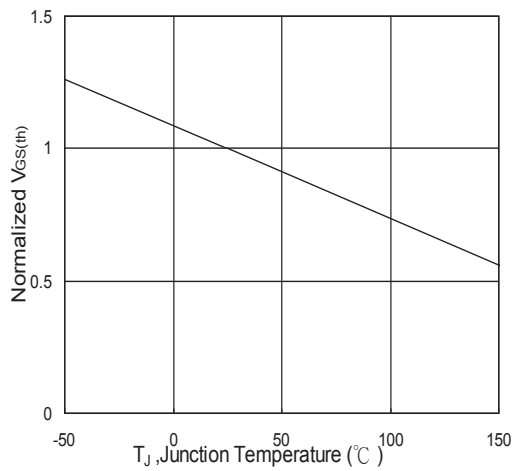


Fig.5 Normalized $V_{GS(th)}$ vs T_J

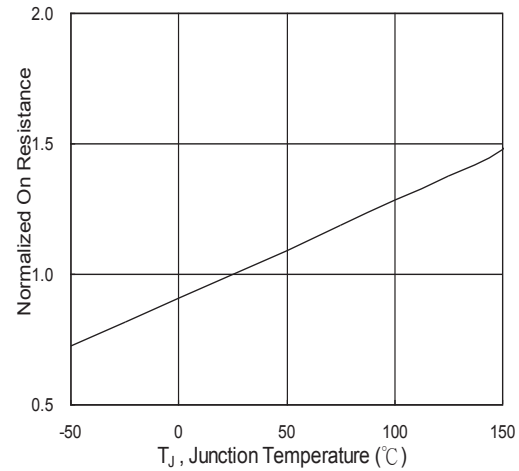


Fig.6 Normalized $R_{DS(on)}$ vs T_J

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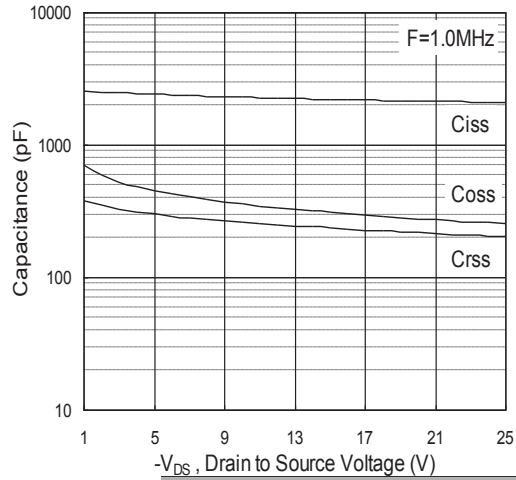


Fig.7 Capacitance

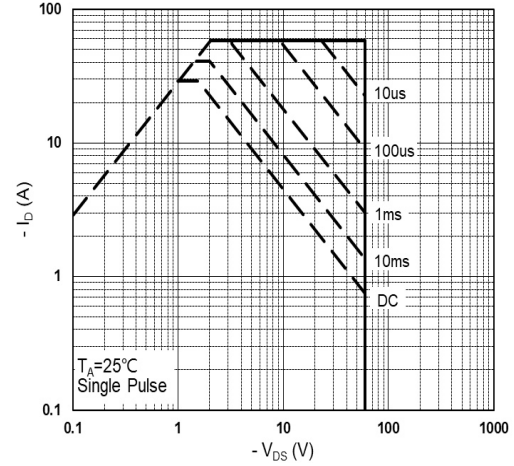


Fig.8 Safe Operating Area

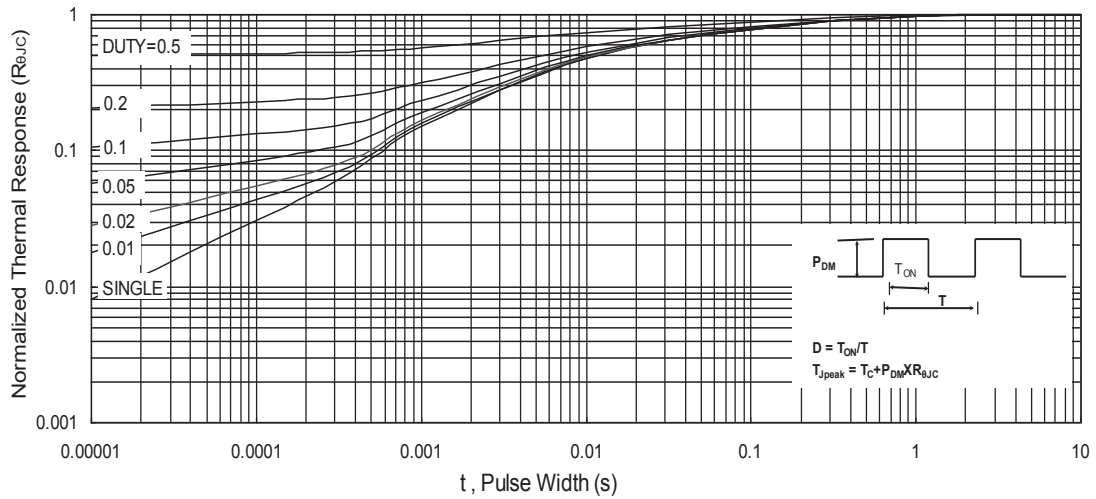


Fig.9 Normalized Maximum Transient Thermal Impedance

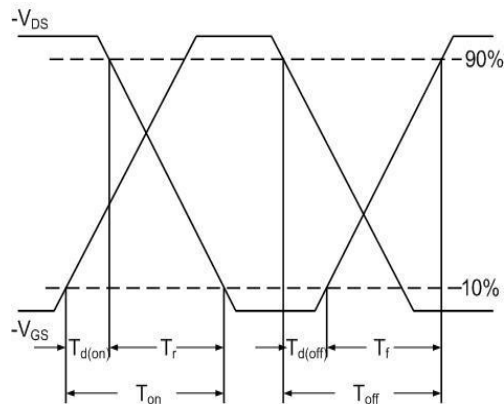


Fig.10 Switching Time Waveform

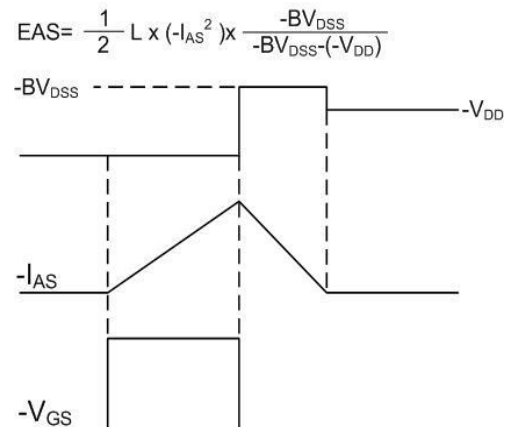


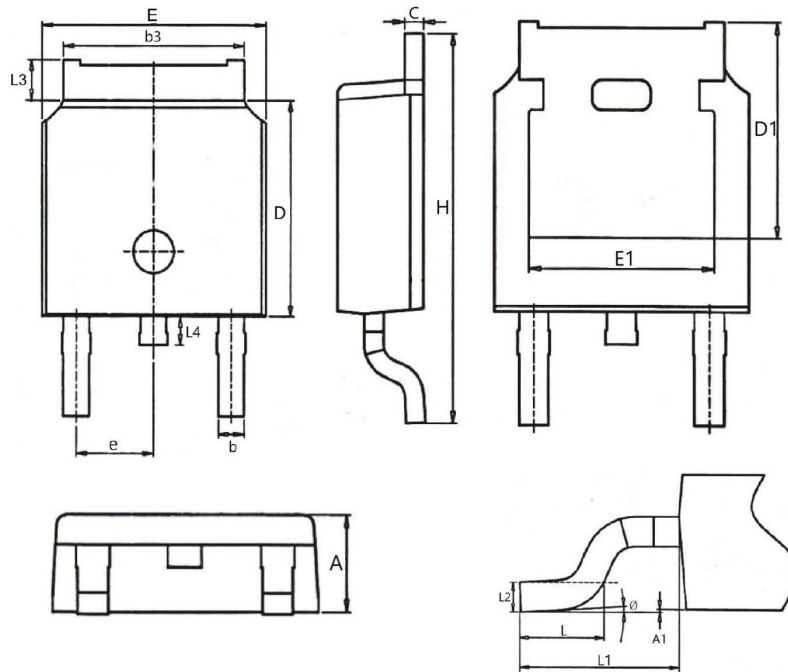
Fig.11 Unclamped Inductive Waveform

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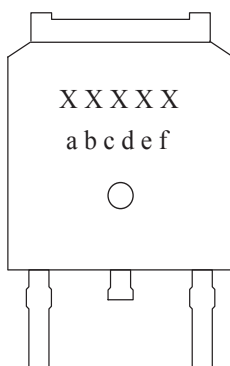
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■TO-252 dimension (2,500pcs/reel)



Symbols	Millimeters		Inches		Symbols	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	2.18	2.40	0.086	0.095	e	2.286BSC		0.09BSC	
A1	---	0.20	---	0.008	H	9.40	10.50	0.370	0.413
b	0.68	0.90	0.026	0.036	L	1.38	1.78	0.054	0.070
b3	4.95	5.46	0.194	0.215	L1	2.90REF		0.114REF	
c	0.43	0.89	0.017	0.035	L2	0.51BSC		0.020BSC	
D	5.97	6.22	0.235	0.245	L3	0.88	1.28	0.034	0.050
D1	5.300REF		0.209REF		L4	0.50	1.00	0.019	0.039
E	6.35	6.73	0.250	0.265	θ	0°	8°	0°	8°
E1	4.32	---	0.170	---					

■Marking



Symbols	Content
xxxxxx	Product code
a	Yearly code: 2019=K, 2020=L, 2021=M...
b, c	Weekly code: 01 to 53
d, e	Sequence: 01 to 99 or 0A to 0Z
f	Assembly code: A to Z (I, O excepted)