

• Product Summary

Part #	V _{DS}	R _{DS(on)} .typ (@V _{GS} =4.5V)	R _{DS(on)} .typ (@V _{GS} =2.5V)	I _D
EFM2301A	-20V	65mΩ	80mΩ	-3A

• Features

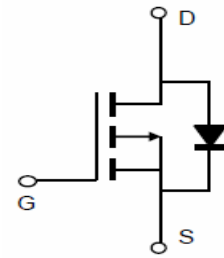
- Low R_{DS(on)} @V_{GS}=-4.5V
- -2.5V Logic Level Control
- P Channel SOT23-3L Package
- Pb-Free, RoHS Compliant

• Application

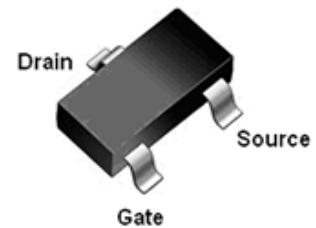
- High-side Load Switch
- Switching Circuits
- High Speed line Driver

• Ordering Information:

Part NO.	EFM2301A
Marking	A1SHB
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000



P-Channel MOSFET



SOT23-3L



• Absolute Maximum Ratings (T_C=25°C)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V _{DS}	-20	V
Gate-Source Voltage	V _{GS}	±12	V
Drain Current-Continuous	I _D	-3	A
Drain Current-Pulsed ^(Note 1)	I _{DM}	-12	A
Maximum Power Dissipation	P _D	1.2	W
Operating Junction and Storage Temperature Range	T _J , T _{STG}	-55 To 150	°C

• Thermal Characteristic

Thermal Resistance, Junction-to-Ambient ^(Note 2)	R _{θJA}	100	°C/W
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• Static Electrical Characteristics @ $T_J = 25^{\circ}\text{C}$ (unless otherwise stated)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250uA	-20	--	--	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-20V V _{GS} =0V	--	--	-1	nA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V V _{DS} =0V	--	--	±100	nA
On Characteristics ^(Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} I _D =250uA	-0.4	-0.6	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =4.5V I _D =-3A	--	65	--	mΩ
		V _{GS} =2.5V I _D =-2.8A	--	80	--	mΩ
Forward Transconductance	g _{FS}	V _{DS} =5V I _D =2.9A	--	--	--	S
Dynamic Characteristics ^(Note4)						
Input Capacitance	C _{Iss}	V _{DS} =-10V V _{GS} =0V F=1.0MHz	--	330	--	PF
Output Capacitance	C _{Oss}		--	50	--	PF
Reverse Transfer Capacitance	C _{rss}		--	45	--	PF
Switching Characteristics ^(Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V I _D =-3A V _{GS} =-4.5V R _G =3.3Ω,	--	11	--	nS
Turn-on Rise Time	t _r		--	12	--	nS
Turn-Off Delay Time	t _{d(off)}		--	18	--	nS
Turn-Off Fall Time	t _f		--	30	--	nS
Total Gate Charge	Q _g	V _{DS} =-10V I _D =-3A V _{GS} =-4.5V	--	6.6	--	nC
Gate-Source Charge	Q _{gs}		--	0.8	--	nC
Gate-Drain Charge	Q _{gd}		--	1.4	--	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage ^(Note 3)	V _{SD}	V _{GS} =0V I _S =-2A	--	-0.85	-1.2	V
Diode Forward Current ^(Note 2)	I _S		--	--	-1.5	A

Notes:

- ① Pulse width limited by maximum allowable junction temperature
 ② Pulse test ; Pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

• Typical Characteristics

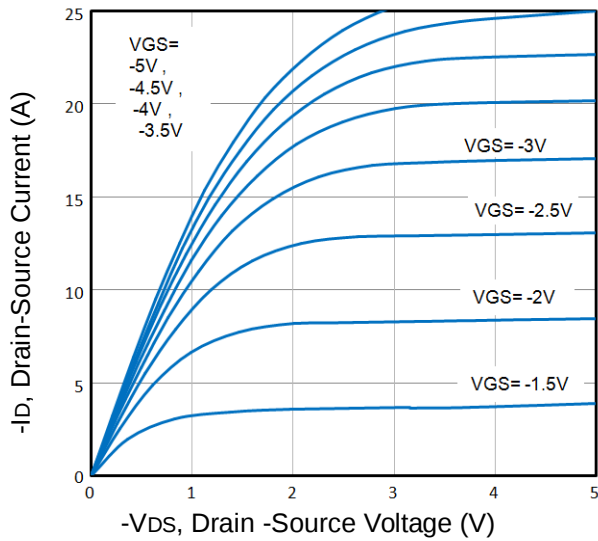


Fig1. Typical Output Characteristics

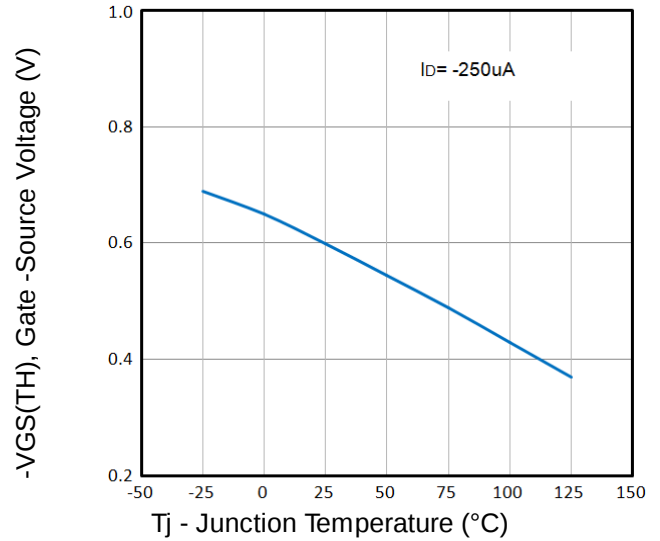


Fig2. Normalized Threshold Voltage Vs. Temperature

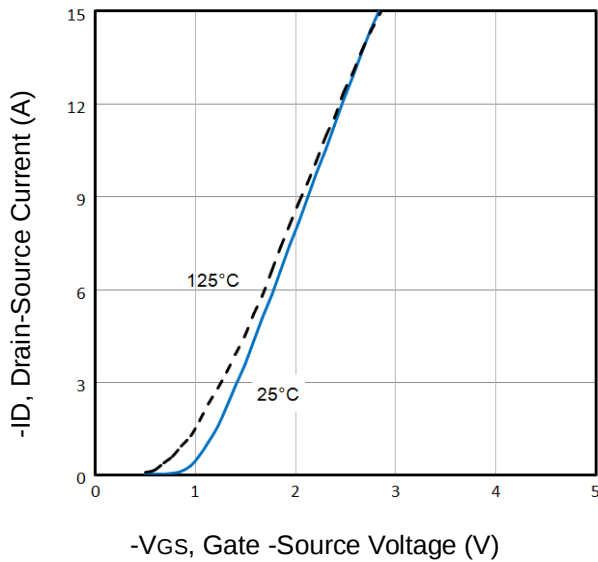


Fig3. Typical Transfer Characteristics

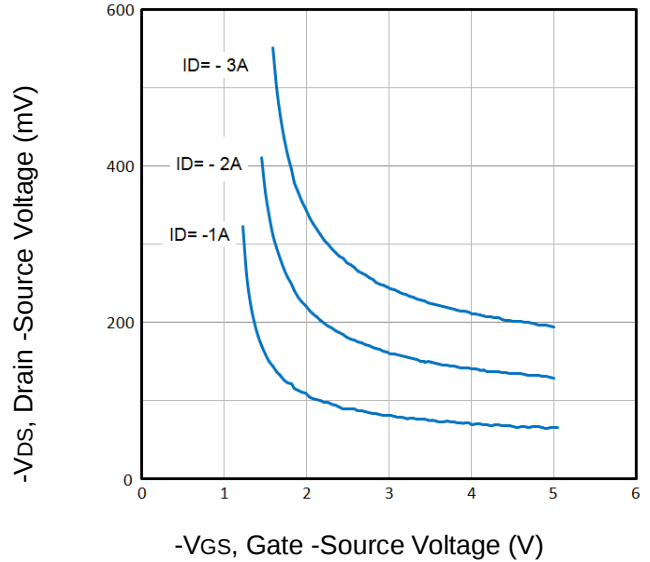


Fig4. Drain-Source Voltage vs Gate-Source Voltage

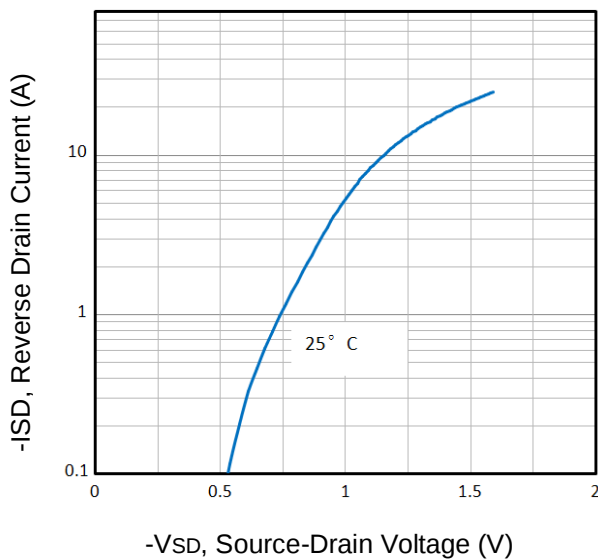


Fig5. Typical Source-Drain Diode Forward Voltage

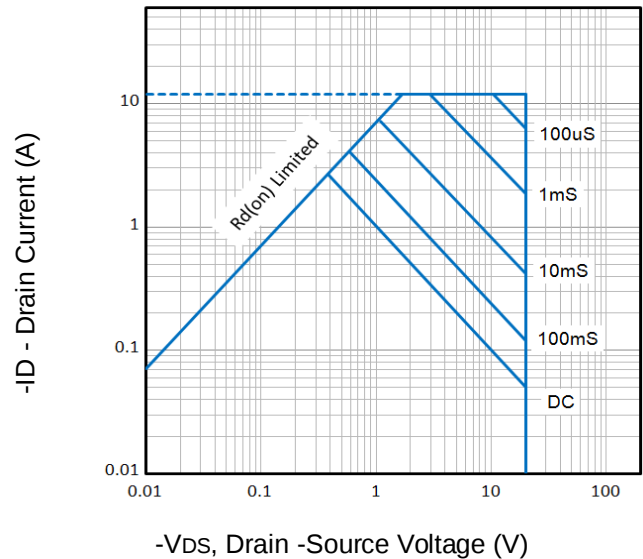


Fig6. Maximum Safe Operating Area

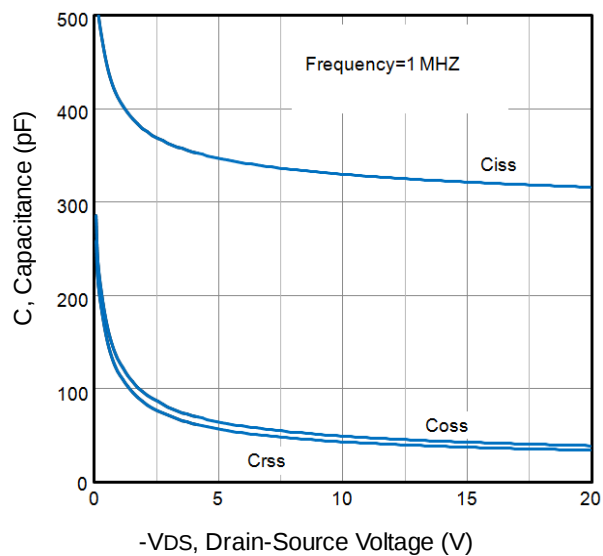


Fig7. Typical Capacitance Vs. Drain-Source Voltage

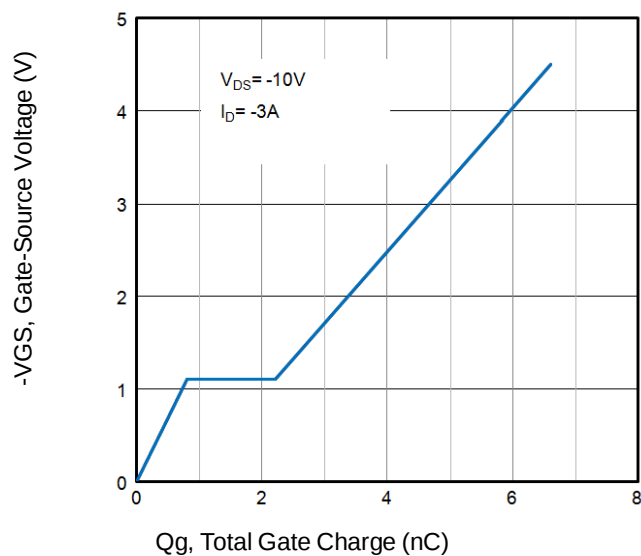


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

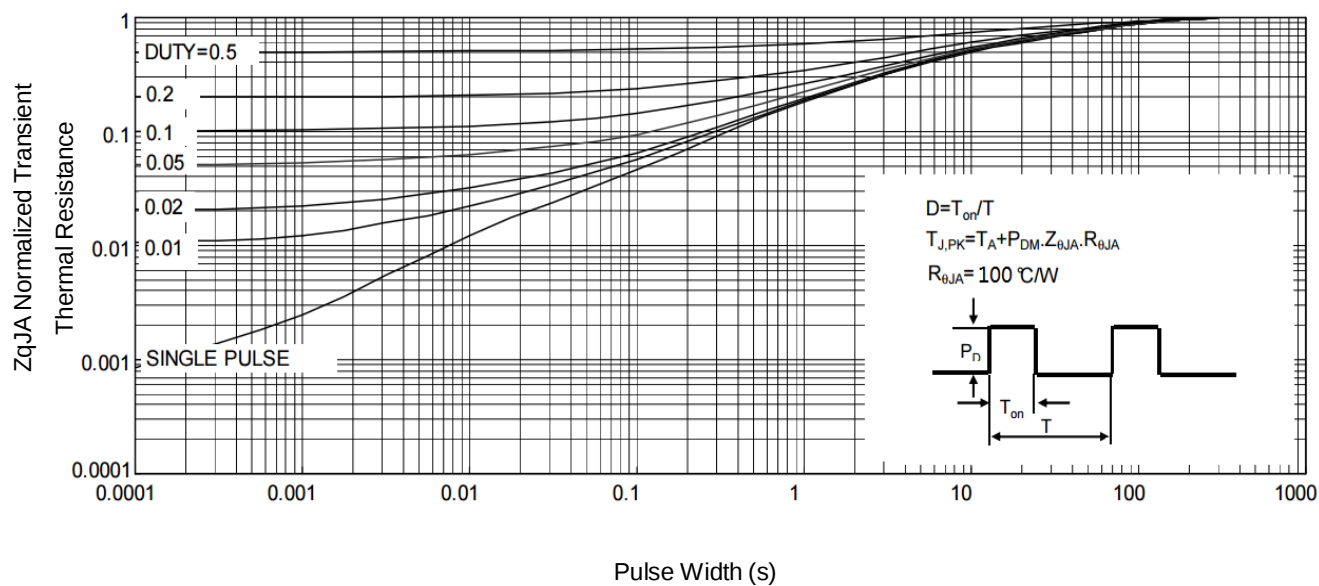


Fig9. Normalized Maximum Transient Thermal Impedance

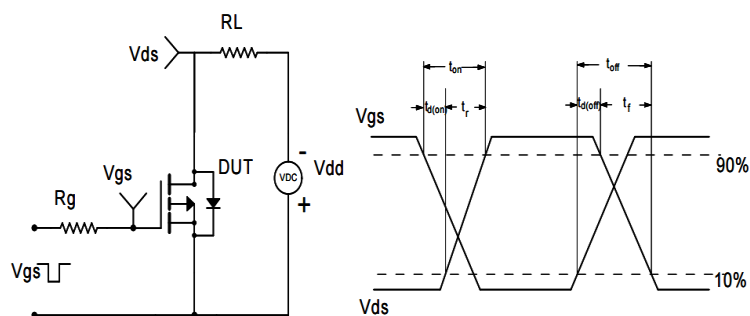
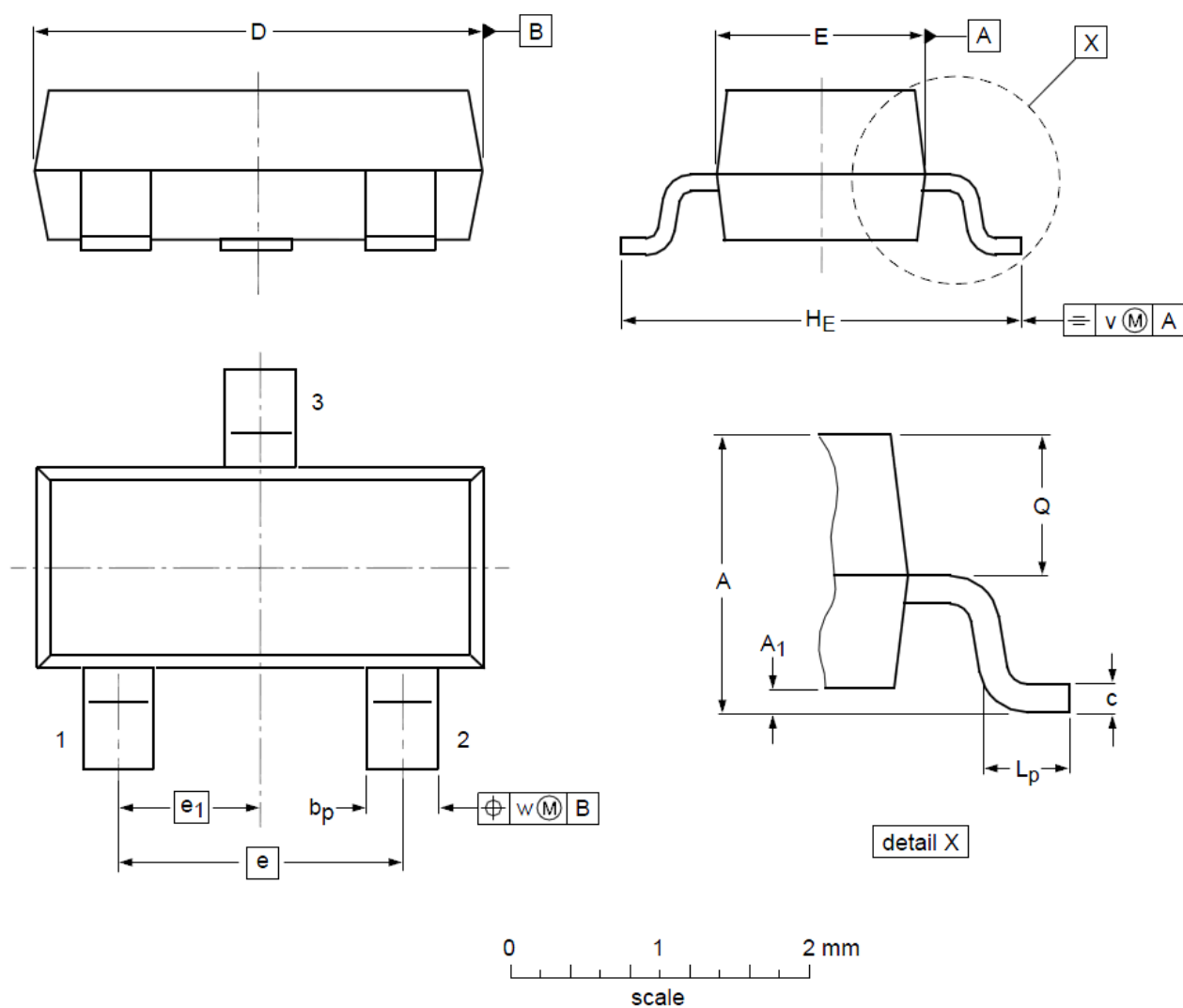


Fig10. Switching Time Test Circuit and waveforms

SOT23-3L Package Outline Dimensions



DIMENSIONS (unit : mm)

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	1.00	1.17	1.30	A ₁	0.01	0.05	0.10
b _p	0.35	0.39	0.50	c	0.10	0.20	0.26
D	2.70	2.90	3.10	E	1.30	1.58	1.70
e	--	1.90	--	e ₁	--	0.95	--
H _E	2.50	2.78	3.00	L _p	0.20	0.32	0.60
Q	0.23	0.27	0.33	v	--	0.20	--
w	--	0.20	--				