

### Product Summary

Part #	$V_{DS}$	$R_{DS(on).typ}$ (@ $V_{GS}=4.5V$ )	$R_{DS(on).typ}$ (@ $V_{GS}=2.5V$ )	$I_D$
EFM2300	20V	21m $\Omega$	30m $\Omega$	6A

### Features

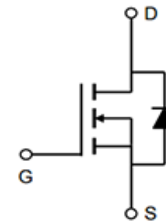
- Low  $R_{DS(on)}$  @  $V_{GS}=-4.5V$
- 2.5V Logic Level Control
- N Channel SOT23 Package
- Pb-Free, RoHS Compliant

### Application

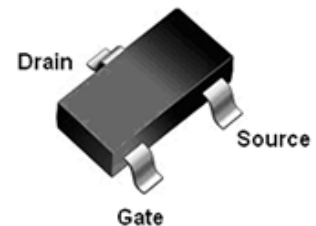
- Load Switch
- DC/DC Converter
- Switching Circuits
- Power Management

### Ordering Information:

Part NO.	EFM2300
Marking	2300
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000



N-Channel MOSFET



SOT- 23



### Absolute Maximum Ratings ( $T_C=25^\circ C$ )

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	6	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	24.8	A
Maximum Power Dissipation	$P_D$	1.56	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$

### Thermal Characteristic

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	80	$^\circ C/W$
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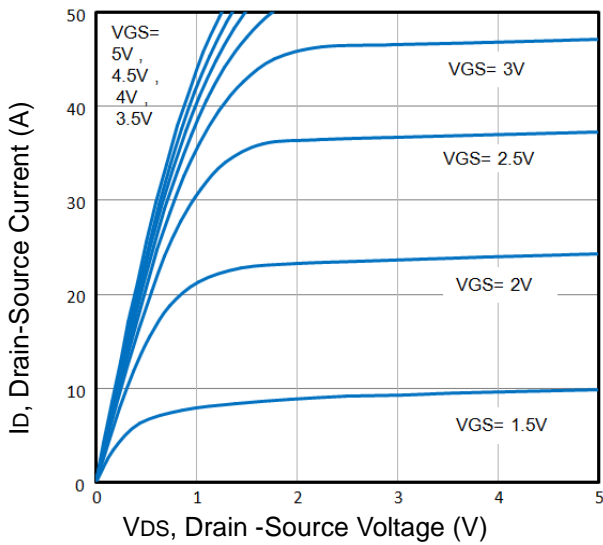
• Static Electrical Characteristics @ T<sub>J</sub> = 25°C (unless otherwise stated)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	BV <sub>DSS</sub>	V <sub>GS</sub> =0V I <sub>D</sub> =250uA	20	--	--	V
Zero Gate Voltage Drain Current	I <sub>DSS</sub>	V <sub>DS</sub> =16V V <sub>GS</sub> =0V	--	--	1	nA
Gate-Body Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±12V V <sub>DS</sub> =0V	--	--	±100	nA
<b>On Characteristics</b> (Note 3)						
Gate Threshold Voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> I <sub>D</sub> =250uA	0.45	0.6	1.0	V
Drain-Source On-State Resistance	R <sub>DS(ON)</sub>	V <sub>GS</sub> =4.5V I <sub>D</sub> =6A	--	21	27	mΩ
		V <sub>GS</sub> =2.5V I <sub>D</sub> =5A	--	30	36	mΩ
<b>Dynamic Characteristics</b> (Note4)						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =10V V <sub>GS</sub> =0V F=1.0MHz	--	457	--	PF
Output Capacitance	C <sub>oss</sub>		--	71	--	PF
Reverse Transfer Capacitance	C <sub>rss</sub>		--	68	--	PF
Gate Resistance	R <sub>g</sub>	F=1.0MHz	--	7.8	--	Ω
<b>Switching Characteristics</b> (Note 4)						
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>DD</sub> =10V I <sub>D</sub> =1A V <sub>GS</sub> =4.5V R <sub>G</sub> =3.3Ω,	--	4.1	--	nS
Turn-on Rise Time	t <sub>r</sub>		--	11.6	--	nS
Turn-Off Delay Time	t <sub>d(off)</sub>		--	24	--	nS
Turn-Off Fall Time	t <sub>f</sub>		--	7.6	--	nS
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =10V I <sub>D</sub> =4A V <sub>GS</sub> =4.5V	--	6.6	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	0.4	--	nC
Gate-Drain Charge	Q <sub>gd</sub>		--	2	--	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	V <sub>SD</sub>	V <sub>GS</sub> =0V I <sub>S</sub> =4A	--	0.79	1.2	V
Diode Forward Current (Note 2)	I <sub>S</sub>		--	--	2	A

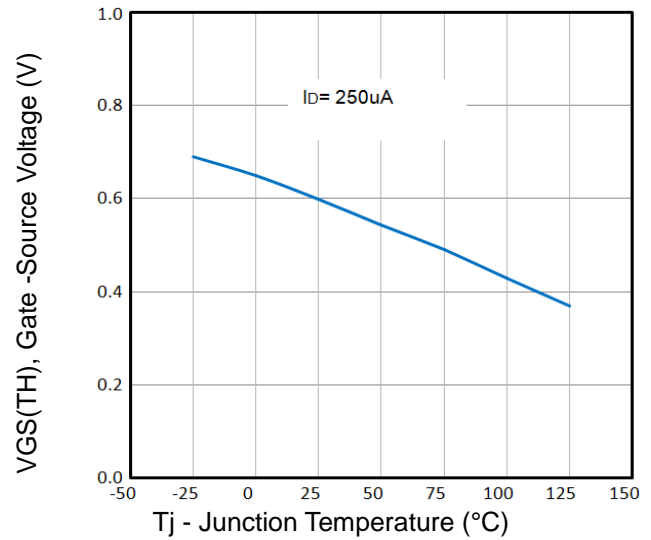
Notes:

- ① Pulse width limited by maximum allowable junction temperature
- ② Pulse test ; Pulse width≤300μs, duty cycle≤2%.

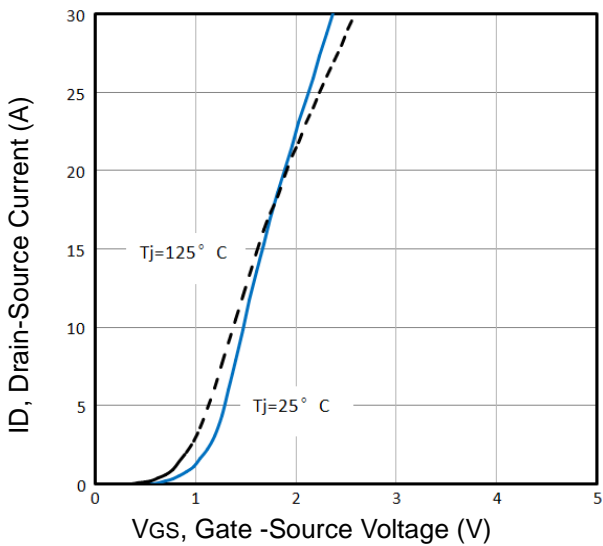
• Typical Characteristics



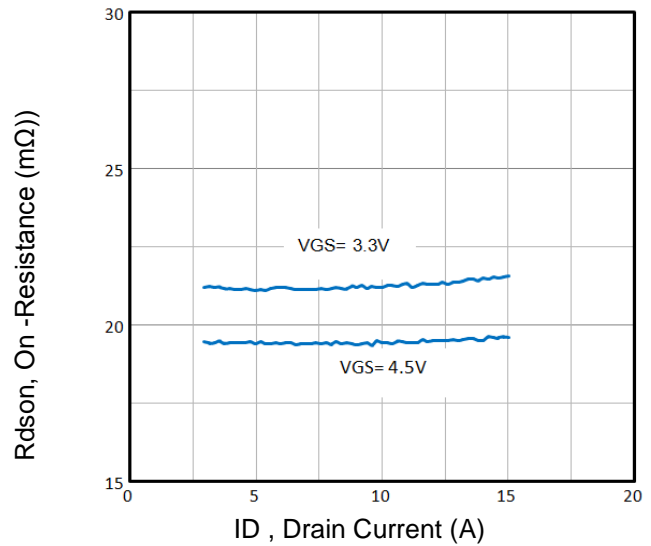
**Fig1.** Typical Output Characteristics



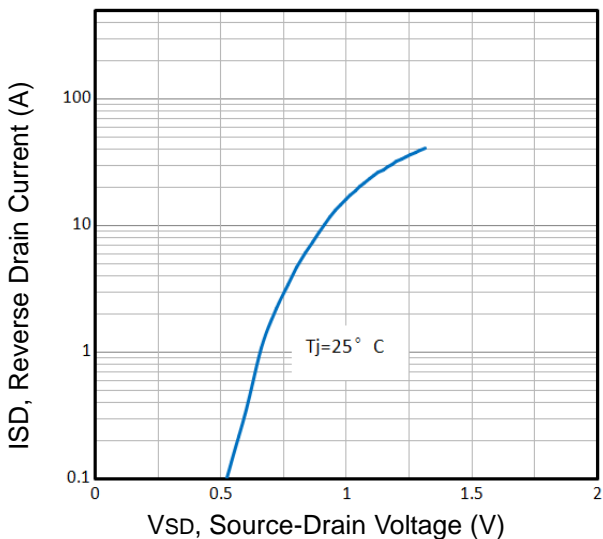
**Fig2.** VGS(TH) Voltage Vs. Temperature



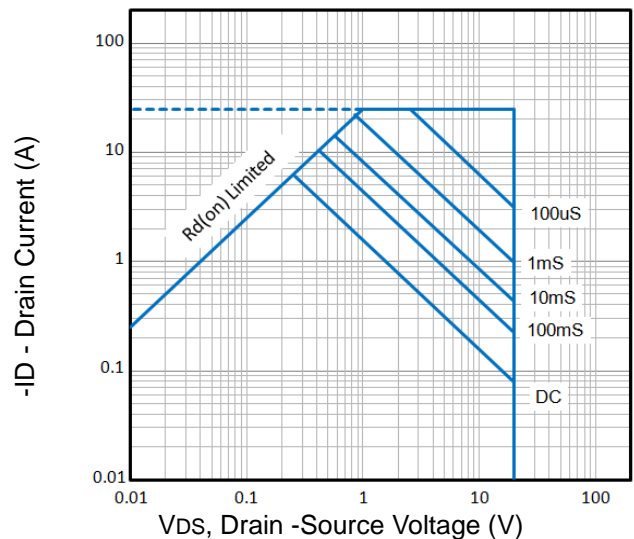
**Fig3.** Typical Transfer Characteristics



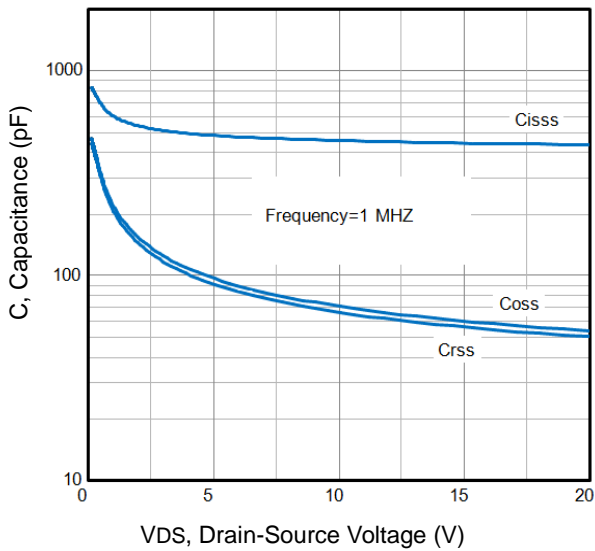
**Fig4.** On-Resistance vs. Drain Current and Gate



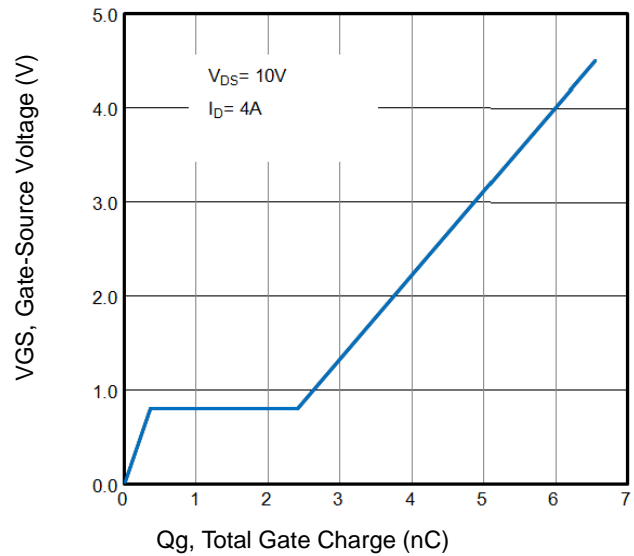
**Fig5.** Typical Source-Drain Diode Forward Voltage



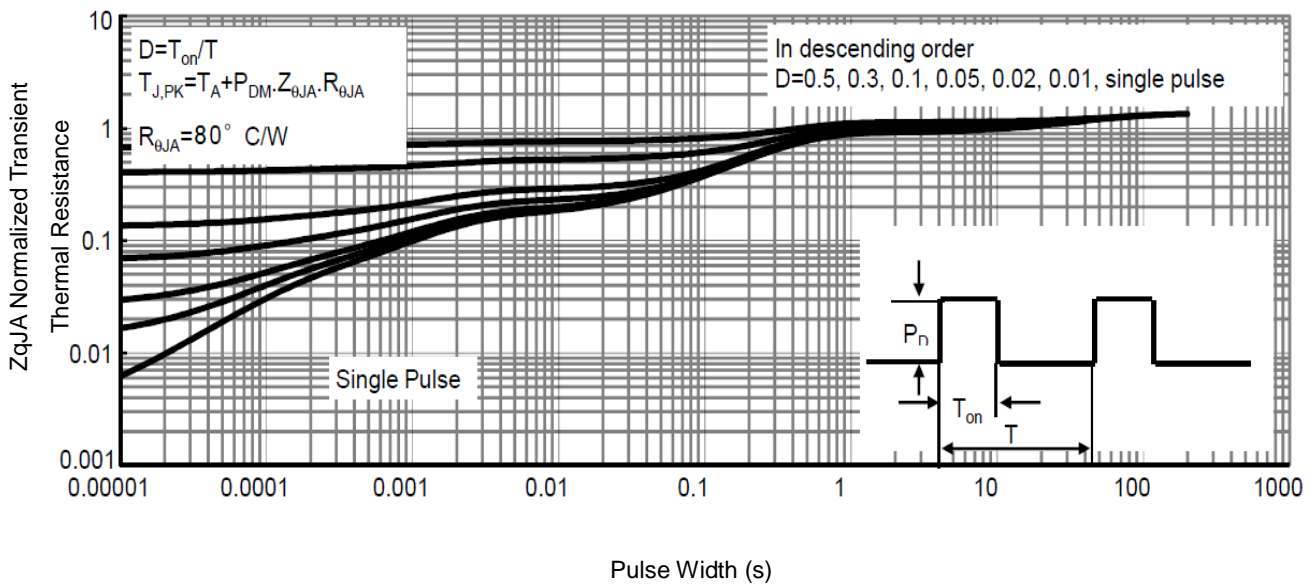
**Fig6.** Maximum Safe Operating Area



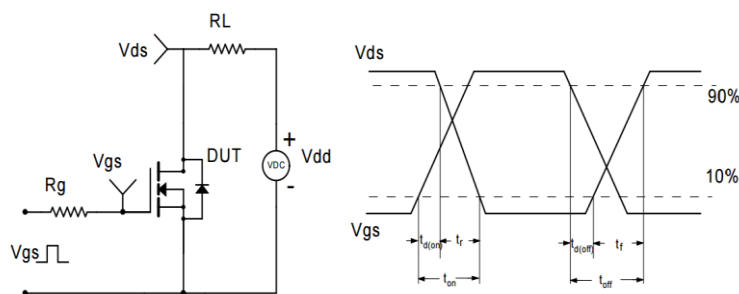
**Fig7.** Typical Capacitance Vs. Drain-Source Voltage



**Fig8.** Typical Gate Charge Vs. Gate-Source Voltage

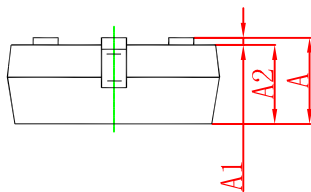
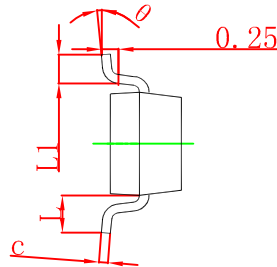
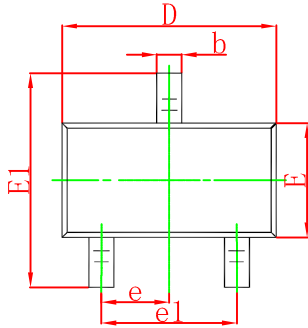


**Fig9.** Normalized Maximum Transient Thermal Impedance

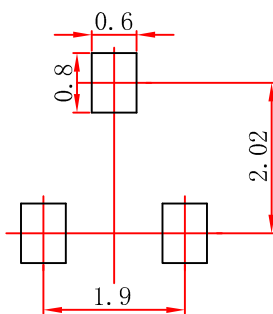


**Fig10.** Switching Time Test Circuit and waveforms

## SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.900	1.150	0.035	0.045
A1	0.000	0.100	0.000	0.004
A2	0.900	1.050	0.035	0.041
b	0.300	0.500	0.012	0.020
c	0.080	0.150	0.003	0.006
D	2.800	3.000	0.110	0.118
E	1.200	1.400	0.047	0.055
E1	2.250	2.550	0.089	0.100
e	0.950 TYP		0.037 TYP	
e1	1.800	2.000	0.071	0.079
L	0.550 REF		0.022 REF	
L1	0.300	0.500	0.012	0.020
θ	0°	8°	0°	8°



**Note:**

1. Controlling dimension: in millimeters.
2. General tolerance:  $\pm 0.05\text{mm}$ .
3. The pad layout is for reference purposes only.