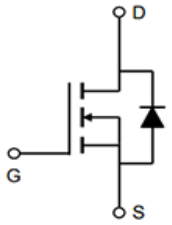
EFMICRO
Semiconductor Limited Company

EFM3402

N-Channel Advanced Power MOSFET

• Product Summary

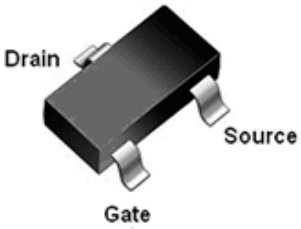
Part #	V_{DS}	$R_{DS(on).typ}$ ($@V_{GS}$=10V)	$R_{DS(on).typ}$ ($@V_{GS}$=4.5V)	I_D
EFM3402	30V	32mΩ	48mΩ	4.2A



N-Channel MOSFET

• Features

- *Low $R_{DS(on)}$ @V_{GS}=10V*
- *4.5V Logic Level Control*
- *N Channel SOT23 Package*
- *Pb−Free, RoHS Compliant*



SOT-23

RoHS

HF

•Application

- DC-to-DC converters
- Power management in battery-driven portables
- Low- side load switch and charging switch for portable devices
- Switching circuits
- High-speed line driver

•Ordering Information:

Part NO.	EFM3402
Marking	A29T
Packing Information	REEL TAPE
Basic ordering unit (pcs)	3000

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±12	V
Drain Current-Continuous	I_D	4.2	A
Drain Current-Pulsed (Note 1)	I_{DM}	20.4	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

•Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	80	℃/W

● Static Electrical Characteristics @ T_J = 25°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	30	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=30V V_{GS}=0V	--	--	1	μA
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	0.5	0.8	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V I_D=4A	--	32	42	mΩ
		V_{GS}=4.5V I_D=3A	--	48	65	mΩ
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=15V V_{GS}=0V F=1.0MHz	--	240	--	PF
Output Capacitance	C_{oss}		--	35	--	PF
Reverse Transfer Capacitance	C_{rss}		--	30	--	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V I_D=1A V_{GS}=10V R_G=3.3Ω,	--	4.4	--	nS
Turn-on Rise Time	t_r		--	2.6	--	nS
Turn-Off Delay Time	$t_{d(off)}$		--	25.5	--	nS
Turn-Off Fall Time	t_f		--	3.3	--	nS
Total Gate Charge	Q_g	V_{DS}=15V I_D=4A V_{GS}=4.5V	--	3.1	--	nC
Gate-Source Charge	Q_{gs}		--	0.4	--	nC
Gate-Drain Charge	Q_{gd}		--	1.3	--	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V I_S=4A	--	0.85	1.2	V
Diode Forward Current (Note 2)	I_S		--	--	4	A

Notes:

① Pulse width limited by maximum allowable junction temperature

②Pulse test ; Pulse width≤300μs, duty cycle≤2%.

• Typical Characteristics

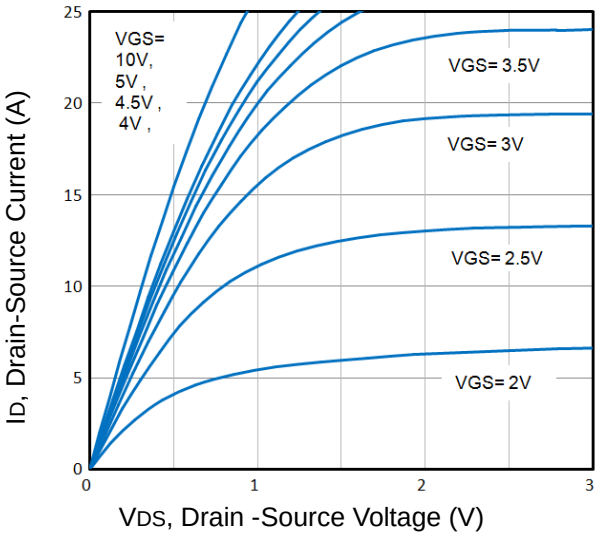


Fig1. Typical Output Characteristics

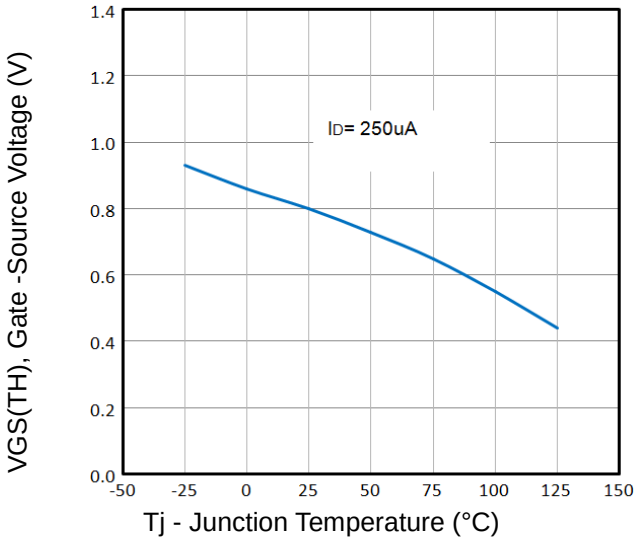


Fig2. Normalized Threshold Voltage Vs. Temperature

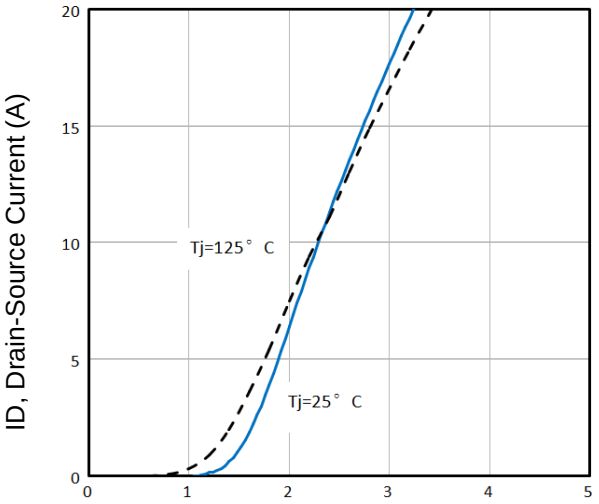


Fig3. Typical Transfer Characteristics

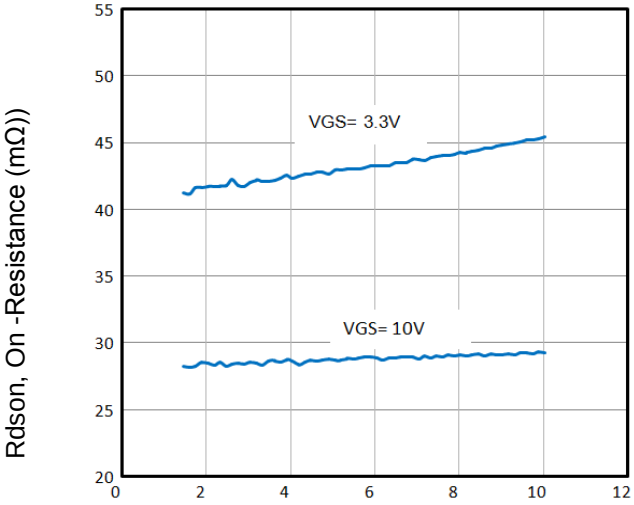


Fig4. On-Resistance vs. Drain Current and Gate

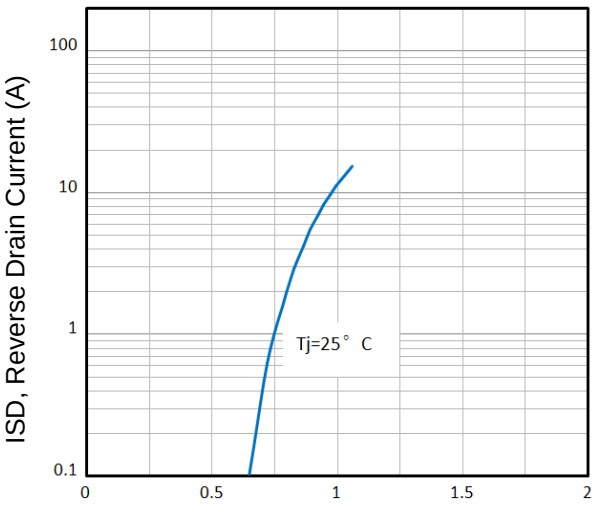


Fig5. Typical Source-Drain Diode Forward Voltage

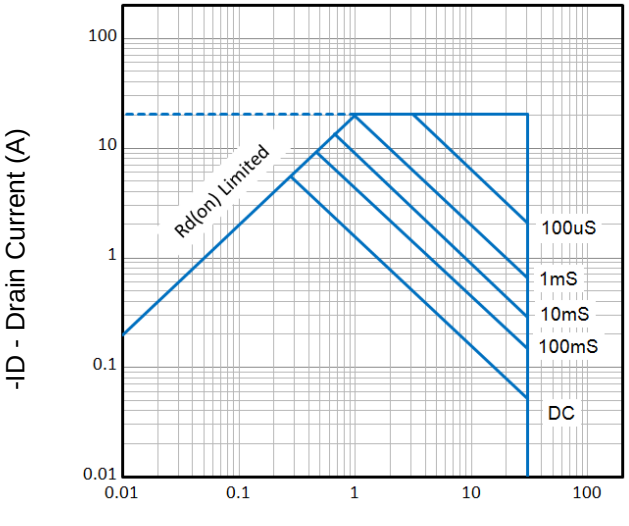


Fig6. Maximum Safe Operating Area

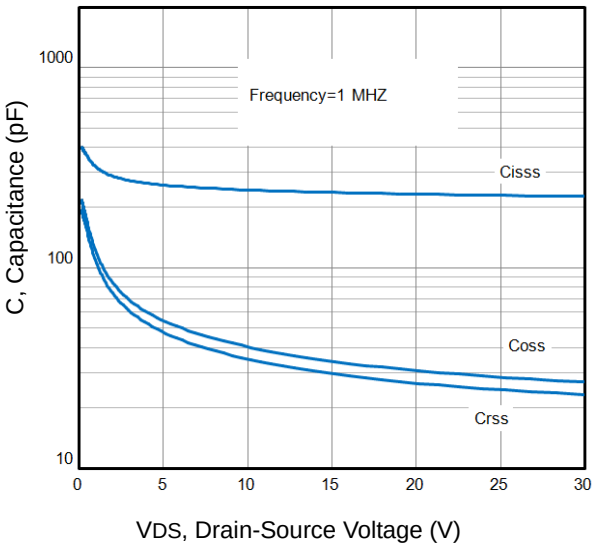


Fig7. Typical Capacitance Vs. Drain-Source Voltage

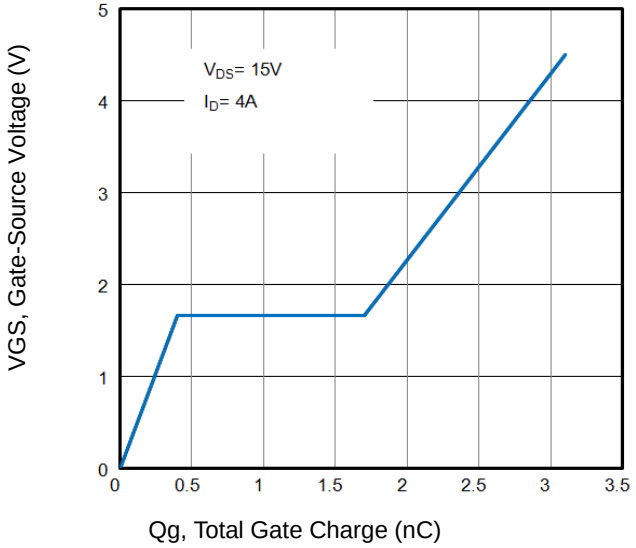


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

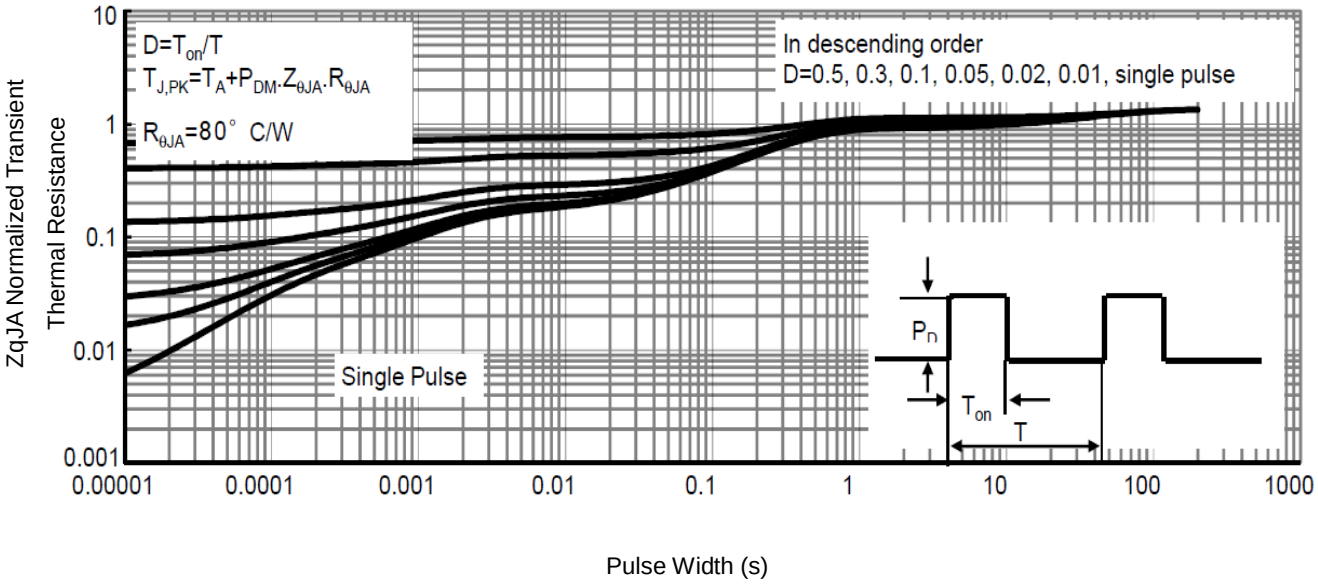


Fig9. Normalized Maximum Transient Thermal Impedance

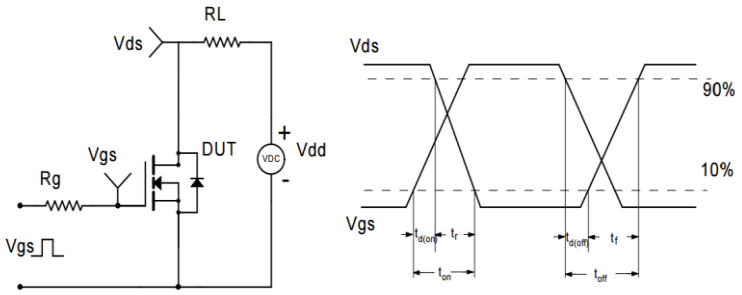
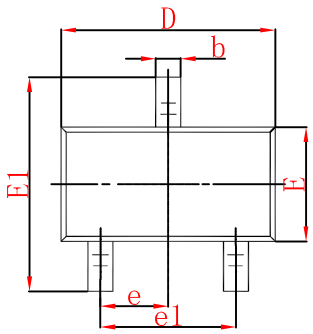
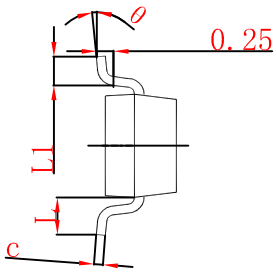
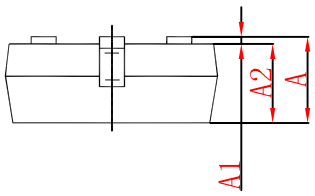


Fig10. Switching Time Test Circuit and waveforms

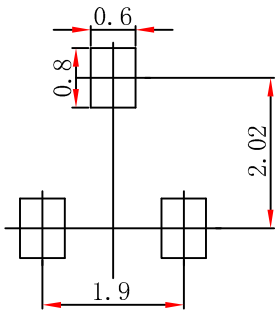
SOT-23 Package Outline Dimensions







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:± 0.05mm.
3.The pad layout is for reference purposes only.