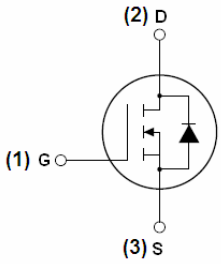
EFMICRO
Semiconductor Limited Company

EFM050N03D

N-Channel Advanced MOSFET

• Product Summary

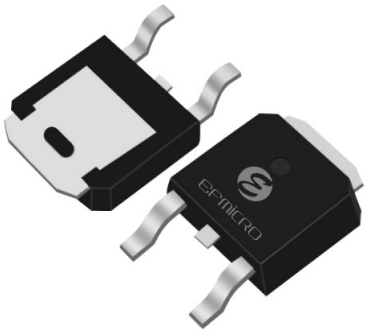
Part #	V_{DS}	$R_{DS(on).typ}$ ($@V_{GS}$=10V)	$R_{DS(on).typ}$ ($@V_{GS}$=4.5V)	I_D
EFM050N03D	30V	5mΩ	6.5mΩ	80A



N-Channel MOSFET

• Description

- The EFM050N03D is the high cell density trenched
- N-ch MOSFETs which provide excellent
- RDSON and gate cherge for most of the
- synchronous buck converter applications.
- The EFM050N03D meet the RoHS and Green
- Prod uct requirement, 100 % EAS guaranteed
- with full function reliability approved.



TO-252-2L

•Application

- Super Low Gate Charge 100% EAS Guaranteed
- Green Device Available Excellent CdV/dt effect decline
- Advanced high cell density Trench technology

•Ordering Information:

Part NO.	EFM050N03D
Marking	050N03D****
Packing Information	REEL TAPE
Basic ordering unit (pcs)	2500

•Absolute Maximum Ratings (T_C=25℃)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	80	A
Drain Current-Pulsed (Note 1)	I_{DM}	170	A
Maximum Power Dissipation	P_D	80	W
Single pulse avalanche energy (Note 5)	E_{AS}	306	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

•Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JC}$	1.8	℃/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}=±20V V_{DS}=0V	--	--	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS} I_D=250uA	1.0	1.5	2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V I_D=30A	--	5	6	mΩ
		V_{GS}=4.5V I_D=24A	--	6.5	9	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V I_D=24A	20	--	--	S

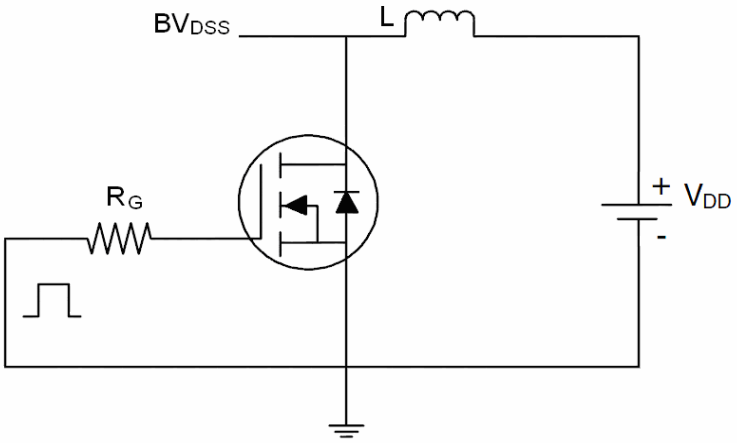
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=15V V_{GS}=0V F=1.0MHz	--	2330	--	PF
Output Capacitance	C_{oss}		--	460	--	PF
Reverse Transfer Capacitance	C_{rss}		--	230	--	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=10V I_D=30A V_{GS}=10V R_G=2.7Ω,	--	20	--	nS
Turn-on Rise Time	t_r		--	15	--	nS
Turn-Off Delay Time	$t_{d(off)}$		--	60	--	nS
Turn-Off Fall Time	t_f		--	10	--	nS
Total Gate Charge	Q_g	V_{DS}=10V I_D=30A V_{GS}=10V	--	51	--	nC
Gate-Source Charge	Q_{gs}		--	14	--	nC
Gate-Drain Charge	Q_{gd}		--	11	--	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V I_S=30A	--	--	1.2	V
Diode Forward Current (Note 2)	I_S		--	--	80	A

Notes:

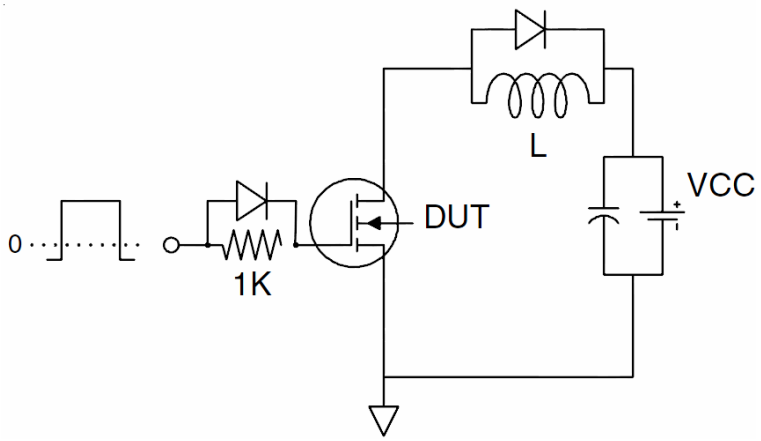
1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition：Tj=25℃,V_{DD}=15V,V_G=10V,L=0.5mH,Rg=25Ω

• Test circuit

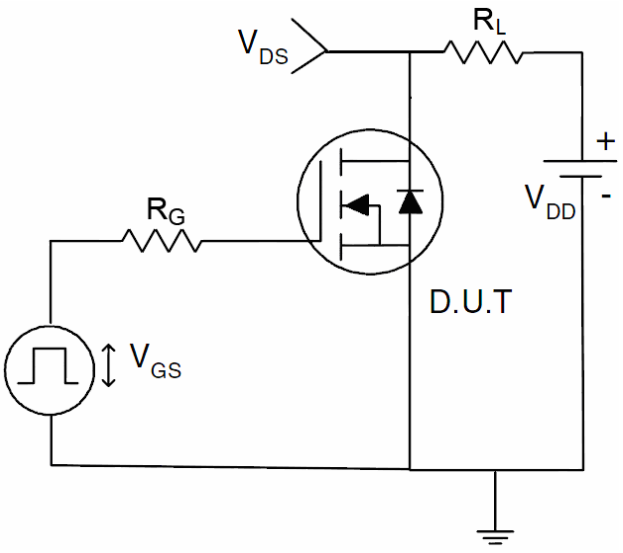
1) E_{AS} Test Circuits



2) Gate Charge Test Circuit:



3) Switch Time Test Circuit:



• Typical Characteristics

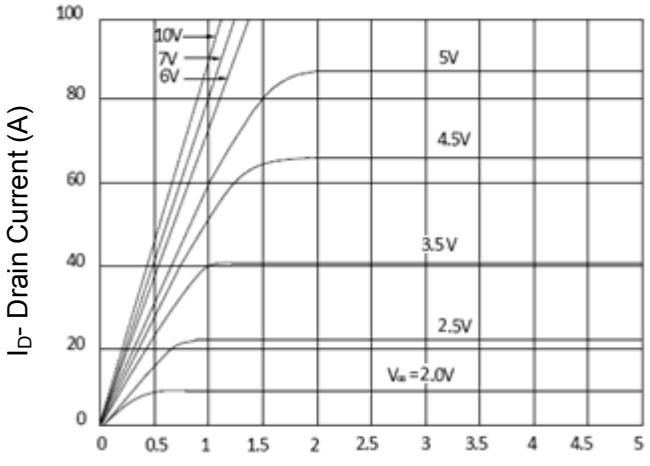


Figure 1 Output Characteristics

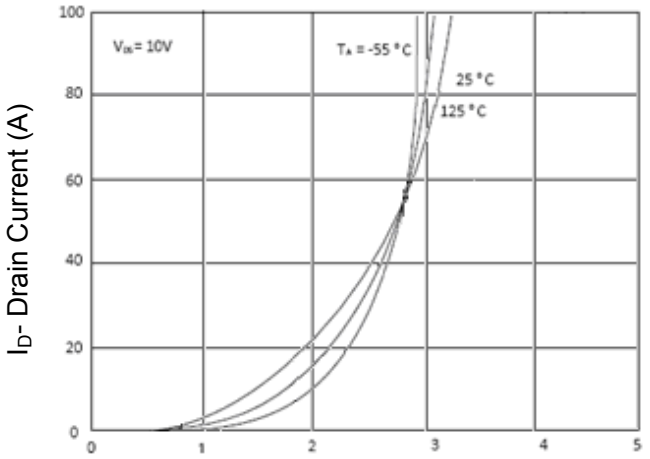


Figure 2 Transfer Characteristics

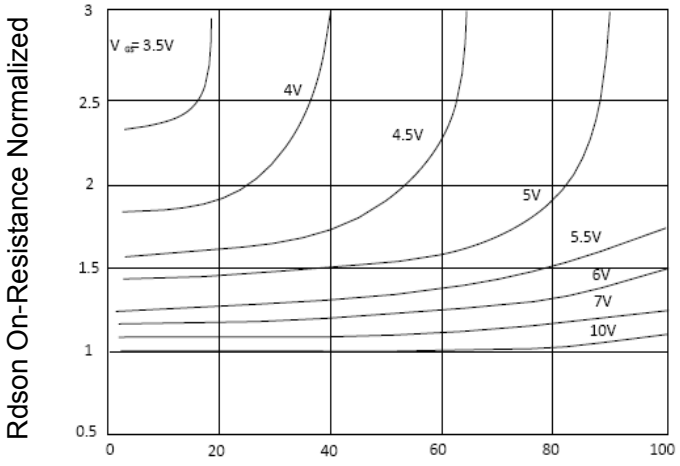


Figure 3 Rdson- Drain Current

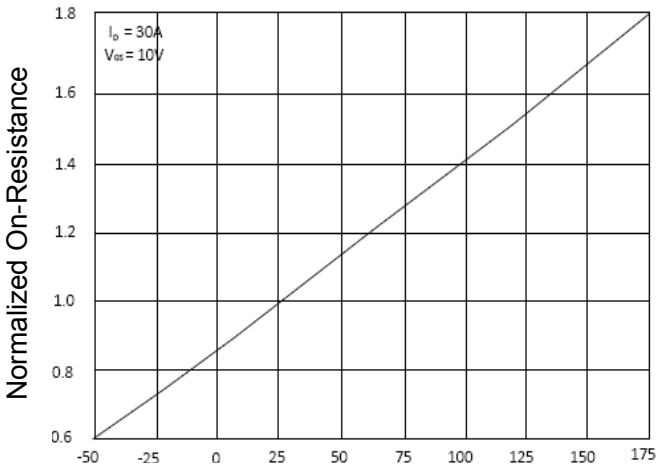


Figure 4 Rdson-Junction Temperature

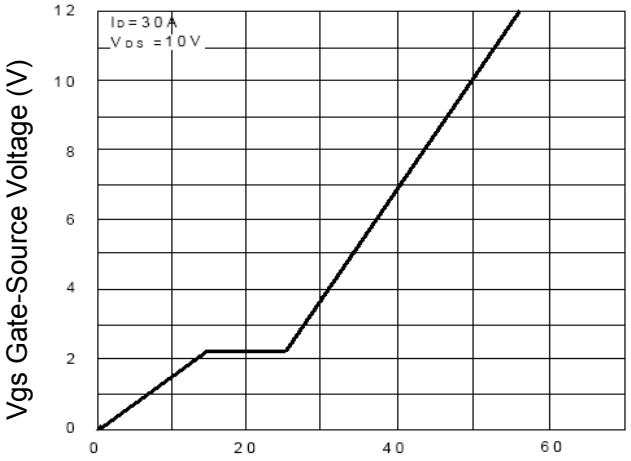


Figure 5 Gate Charge

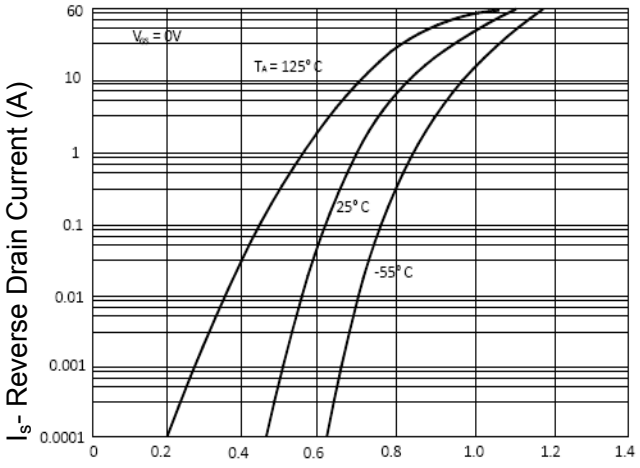


Figure 6 Source- Drain Diode Forward

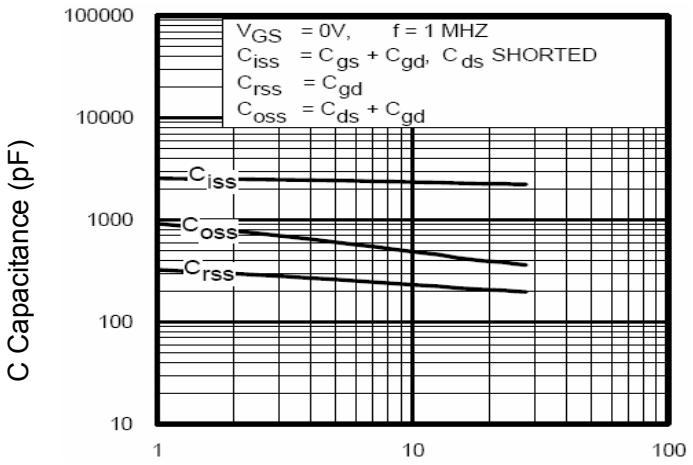


Figure 7 Capacitance vs Vds

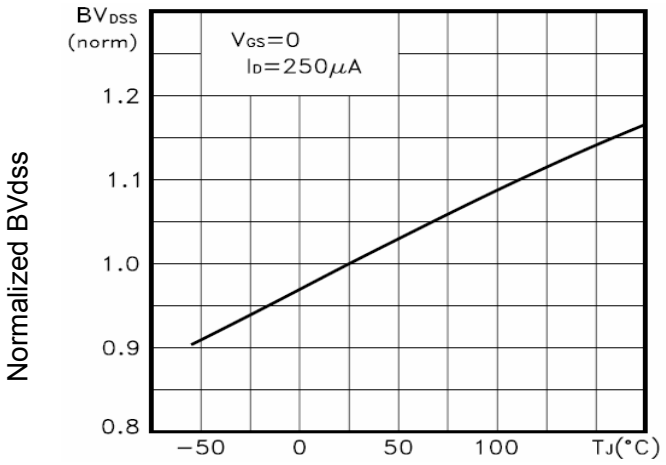


Figure 9 BV_{DSS} vs Junction Temperature

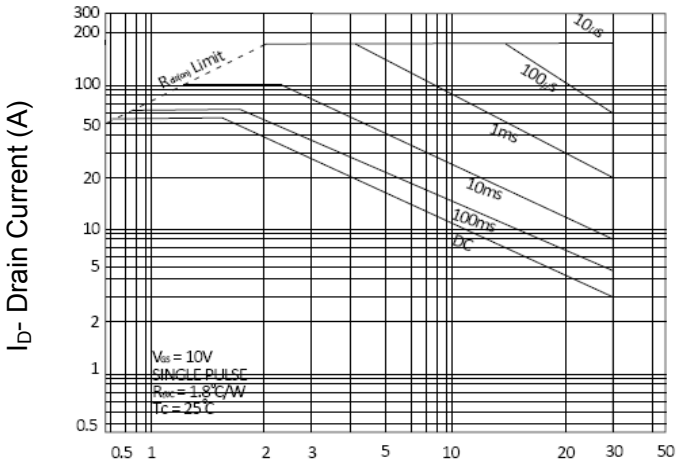


Figure 8 Safe Operation Area

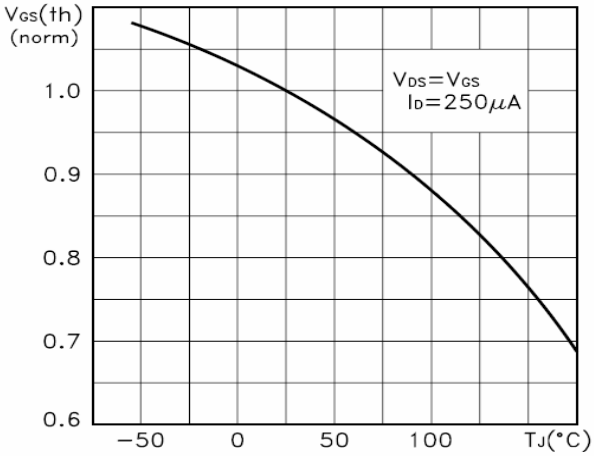


Figure 10 $V_{GS(th)}$ vs Junction Temperature

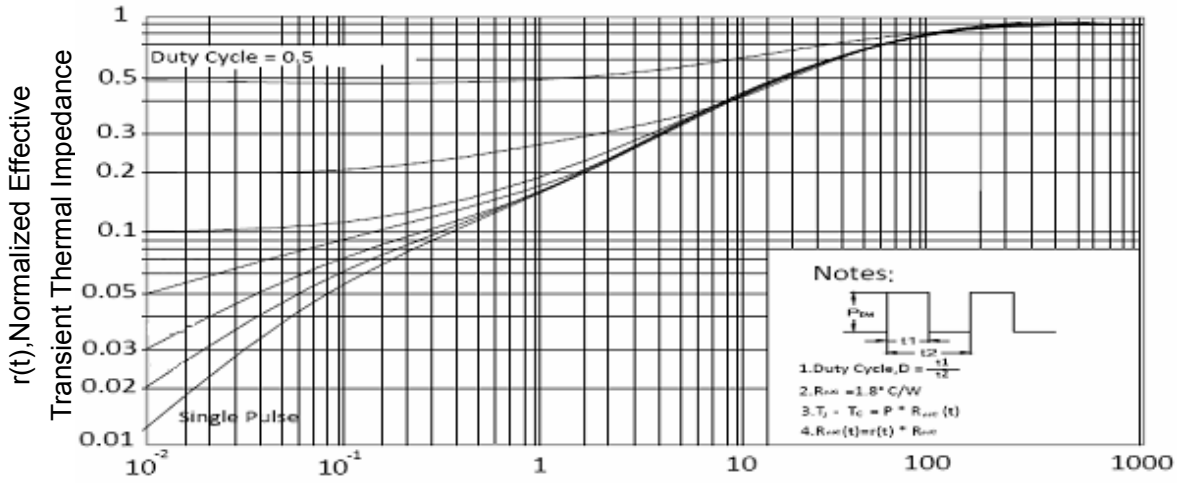
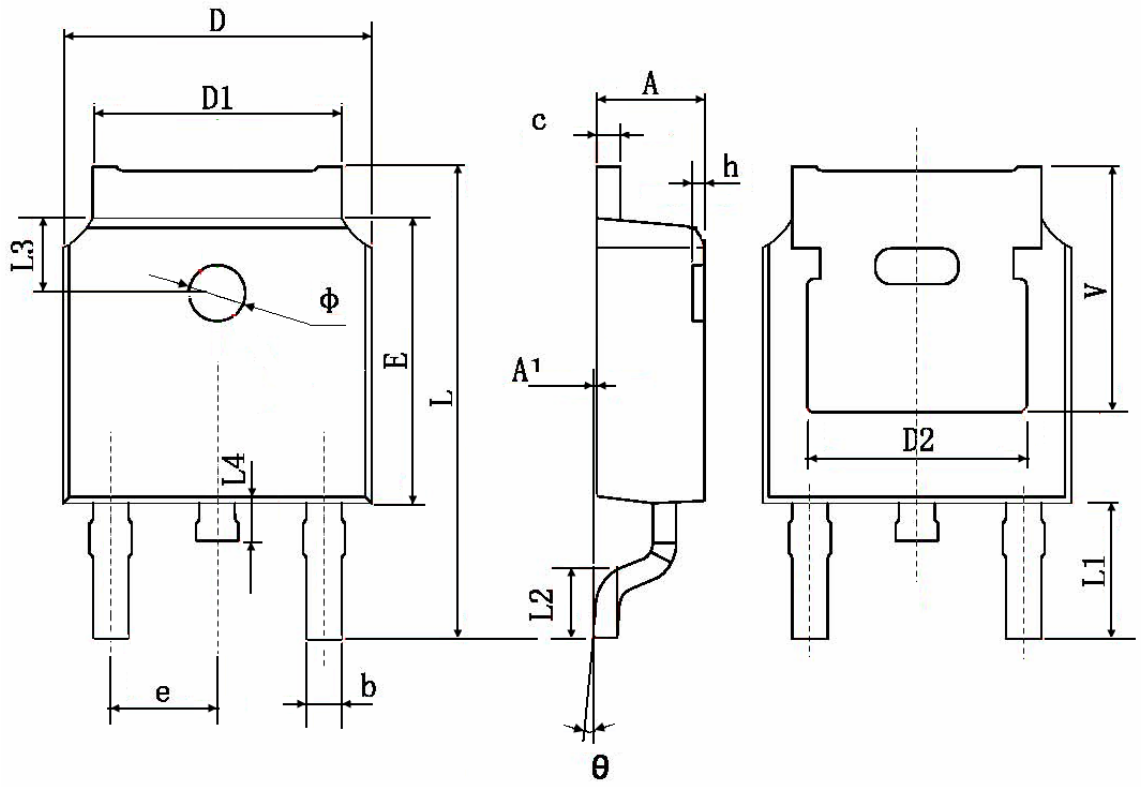


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.200	2.400	0.087	0.094
A1	0.000	0.127	0.000	0.005
b	0.660	0.860	0.026	0.034
c	0.460	0.580	0.018	0.023
D	6.500	6.700	0.256	0.264
D1	5.100	5.460	0.201	0.215
D2	4.83 TYP.		0.190 TYP.	
E	6.000	6.200	0.236	0.244
e	2.186	2.386	0.086	0.094
L	9.800	10.400	0.386	0.409
L1	2.900 TYP.		0.114 TYP.	
L2	1.400	1.700	0.055	0.067
L3	1.600 TYP.		0.063 TYP.	
L4	0.600	1.000	0.024	0.039
Φ	1.100	1.300	0.043	0.051
θ	0°	8°	0°	8°
h	0.000	0.300	0.000	0.012
V	5.350 TYP.		0.211 TYP.	