Etek Microelectronics

EMR12N03T1

30V N-Channel Enhancement Mode Power MOSFET

Description

EMR12N03T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

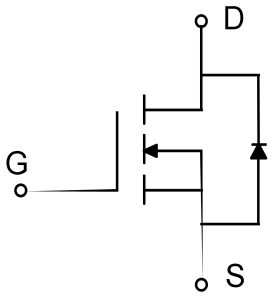
- V_{DS} =30V, I_D = 12A
  $R_{DS(on)}$ < 9mΩ @ V_{GS} = 10V
  $R_{DS(on)}$ < 12.5mΩ @ V_{GS} = 4.5V
- Green Device Available
- High Power and Current Handing Capability

Applications

- Battery Protection
- Power Management
- Load Switch

Schematic

DFN2020-6L



Absolute Maximum Ratings

Parameter		Symbol	Value	Unit
Drain-Source Voltage		V_{DS}	30	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	T_A=25°C	I_D	12	A
	T_A=100°C		7	
Pulsed Drain Current[4]		I_{DM}	48	A
Single Pulse Avalanche Energy[3]		EAS	20	mJ
Total Power Dissipation	T_A=25°C	P_D	2.1	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	°C

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient[1]	$R_{\theta JA}$	60	°C/W

Electrical Characteristics T_c = 25°C, unless otherwise noted

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	30	-	-	V
Gate-body Leakage current	I_{GSS}	V_{DS} = 0V, V_{GS} = ±20V	-	-	±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 30V, V_{GS} = 0V	-	-	1	μA
Gate-Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1	1.6	2.5	V
Drain-Source on-Resistance[2]	$R_{DS(on)}$	V_{GS} = 10V, I_D = 8A	-	6.8	9	mΩ
		V_{GS} = 4.5V, I_D = 6A	-	10	12.5	
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} =0V, f =1.0 MHz	-	1250	-	pF
Output Capacitance	C_{oss}		-	174	-	
Reverse Transfer Capacitance	C_{rss}		-	142	-	
Switching Characteristics						
Gate Resistance	R_G	V_{DS} = 0V, V_{GS} =0V, f =1MHz	-	2.8	-	Ω
Total Gate Charge	Q_g	V_{GS} = 4.5V, V_{DS} = 15V, I_D=12A	-	10	-	nC
Gate-Source Charge	Q_{gs}		-	3.5	-	
Gate-Drain Charge	Q_{gd}		-	2.2	-	
Turn-on Delay Time	$t_{d(on)}$	V_{GS} =4.5V, V_{DS} =15V, I_D= 10A, R_G=3Ω	-	8	-	ns
Rise Time	t_r		-	28	-	
Turn-off Delay Time	$t_{d(off)}$		-	15	-	
Fall Time	t_f		-	7	-	
Drain-Source Body Diode Characteristics						
Diode Forward Voltage[2]	V_{SD}	I_S = 1A, V_{GS} = 0V	-	-	1.2	V
Continuous Source Current[1,5]	I_S	V_G=V_D=0V , Force Current	-	-	12	A

Notes:

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 ≤ 300us, duty cycle ≤ 2%

3. The EAS data shows Max. rating . The test condition is V_{DD}= 25V, V_{GS}= 10V, L= 0.1mH, I_{AS}= 20A

4. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150°C.

5. The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation

Typical Characteristics

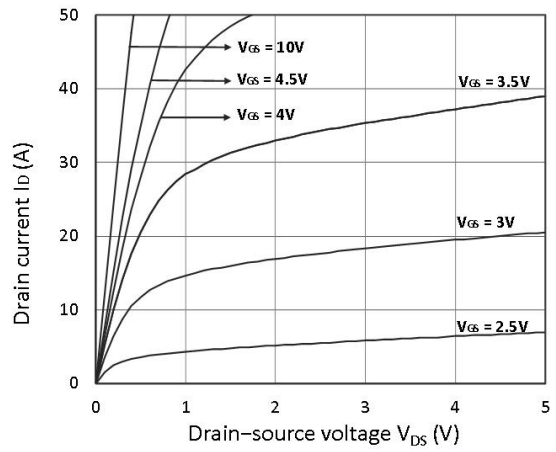


Figure 1. Output Characteristics

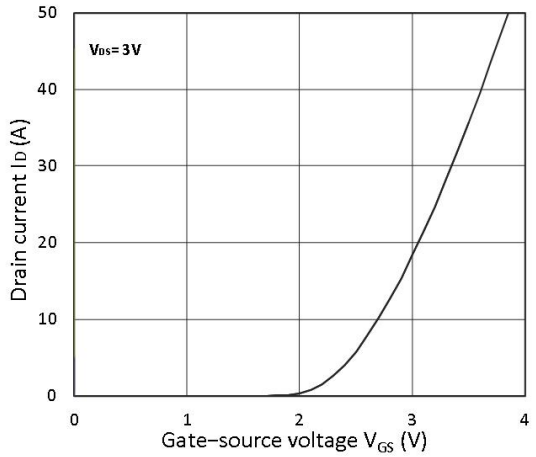


Figure 2. Transfer Characteristics

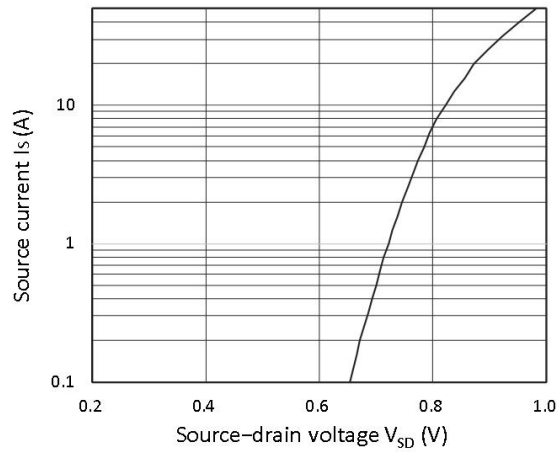


Figure 3. Forward Characteristics of Reverse

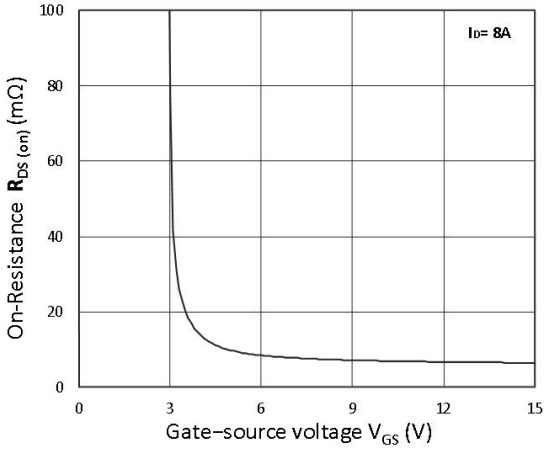


Figure 4. $R_{DS(ON)}$ vs. V_{GS}

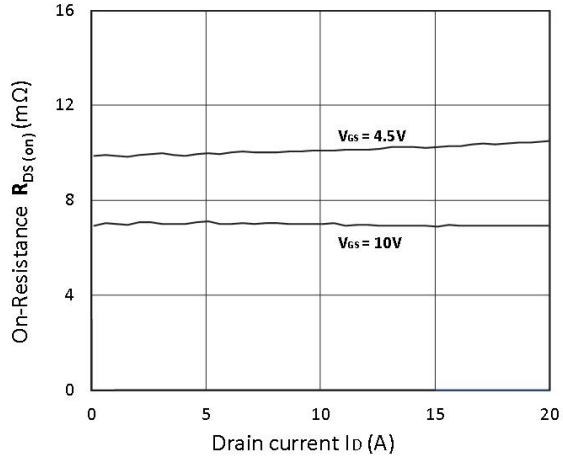


Figure 5. $R_{DS(ON)}$ vs. I_D

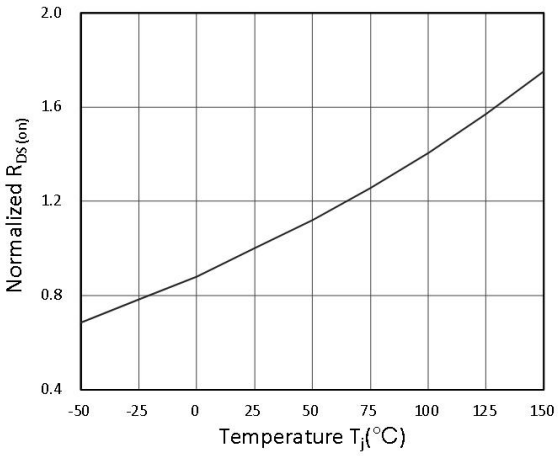


Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

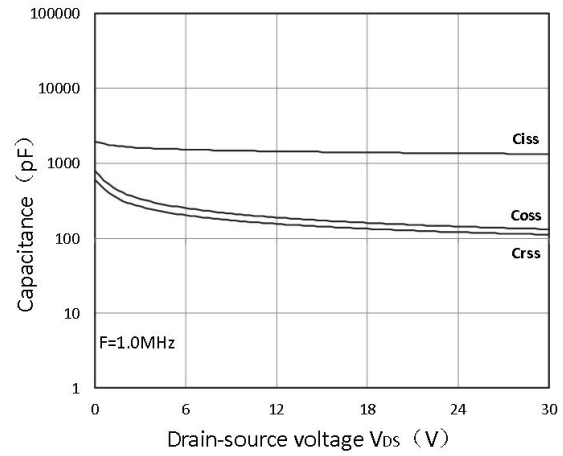


Figure 7. Capacitance Characteristics

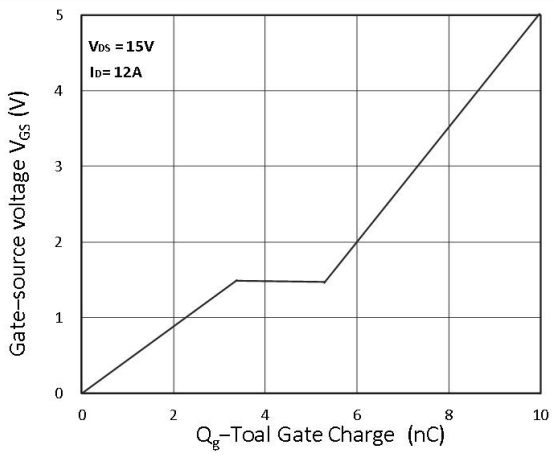


Figure 8. Gate Charge Characteristics

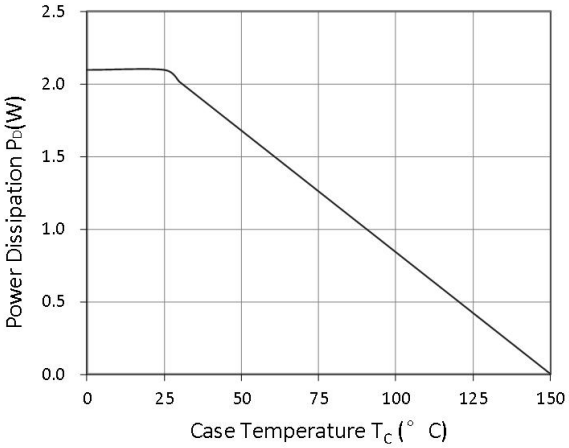


Figure 9. Power Dissipation

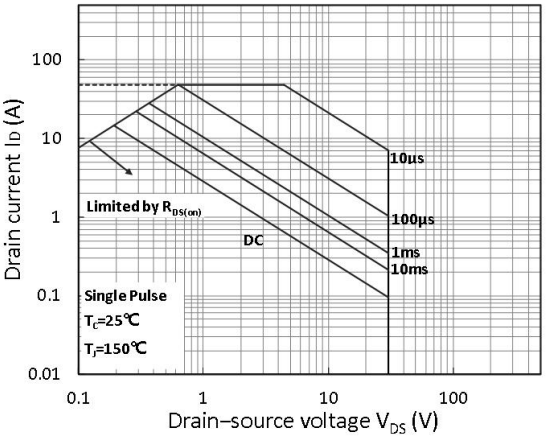


Figure10. Safe Operating Area

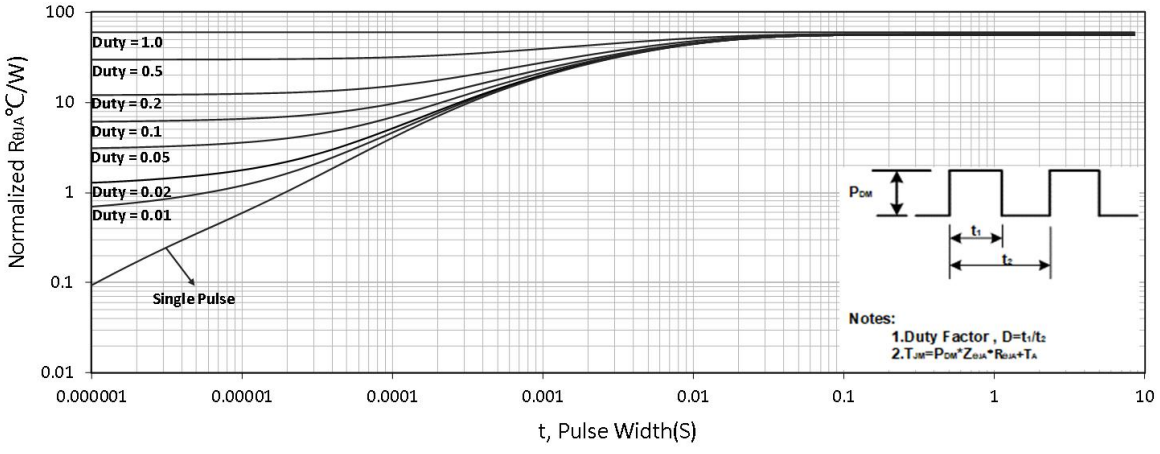


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

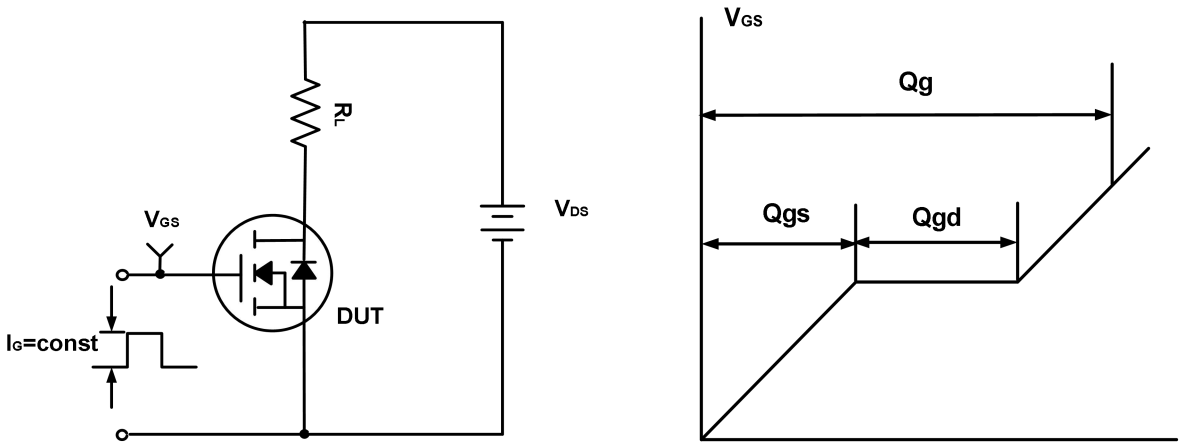


Figure A. Gate Charge Test Circuit & Waveforms

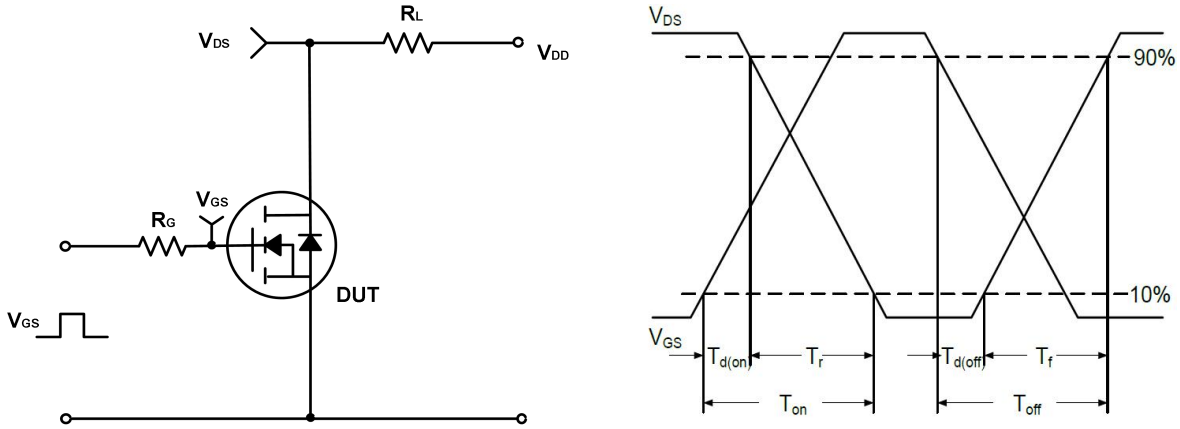


Figure B. Switching Test Circuit & Waveforms

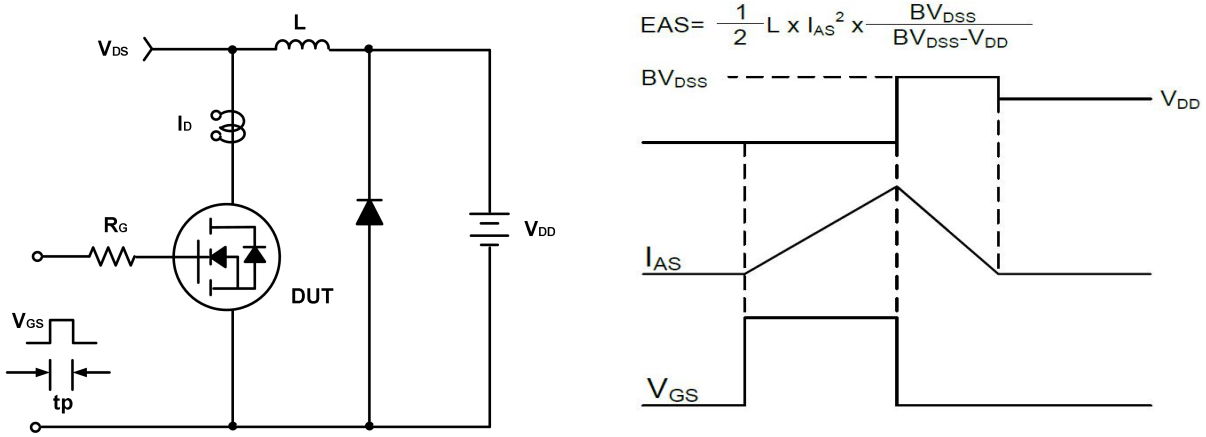
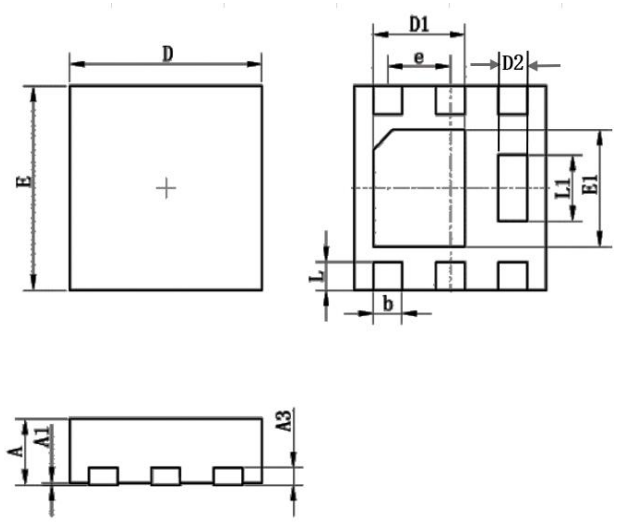


Figure C. Unclamped Inductive Switching Circuit & Waveforms

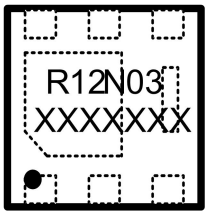
Mechanical Dimensions for DFN2020-6L

PACKAGE OUTLINE



SYMBOL	MM	
	MIN	MAX
A	0.50	0.60
A1	0.00	0.05
A3	0.152REF	
b	0.25	0.35
D	1.90	2.10
D1	0.80	1.00
E	1.90	2.10
E1	0.80	1.00
L1	0.46	0.66
D2	0.25	0.35
e	0.65BSC	
L	0.25	0.35

Marking Information

Part No.	Marking
EMR12N03T1	 R12N03= Device code XXXXXXX= Date code

Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2020-05-08	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying