

30V P-Channel Enhancement Mode Power MOSFET

Description

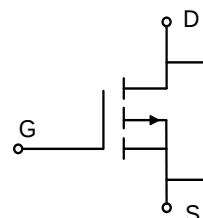
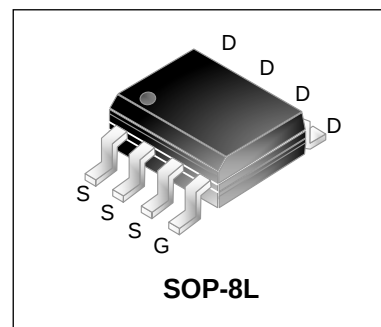
EMS12P03T1 uses advanced power trench technology that has been especially tailored to minimize the on-state resistance and yet maintain superior switching performance.

Features

- $V_{DS} = -30V$, $I_D = -11.5A$
 $R_{DS(on)} < 15m\Omega$ @ $V_{GS} = -10V$
 $R_{DS(on)} < 25m\Omega$ @ $V_{GS} = -4.5V$
- High Power and Current Handling Capability
- Low Gate Charge

Applications

- Power Management Switches
- Battery Protection Applications



Absolute Maximum Ratings ($T_A = 25^\circ C$, unless otherwise noted)

Parameter		Symbol	Value	Unit
Drain-Source voltage		V_{DS}	-30	V
Gate-Source voltage		V_{GS}	± 20	V
Continuous Drain Current	$T_A = 25^\circ C$	I_D	-11.5	A
	$T_A = 100^\circ C$		-7.3	
Pulsed Drain Current ¹		I_{DM}	-45.8	A
Single Pulse Avalanche Energy ²		EAS	80	mJ
Total Power Dissipation	$T_A = 25^\circ C$	P_D	3	W
Operating Junction and Storage Temperature Range		T_J, T_{STG}	-55 to 150	$^\circ C$

Thermal Characteristics

Parameter	Symbol	Value	Unit
Thermal Resistance from Junction-to-Ambient ³	$R_{\theta JA}$	41.6	$^\circ C/W$

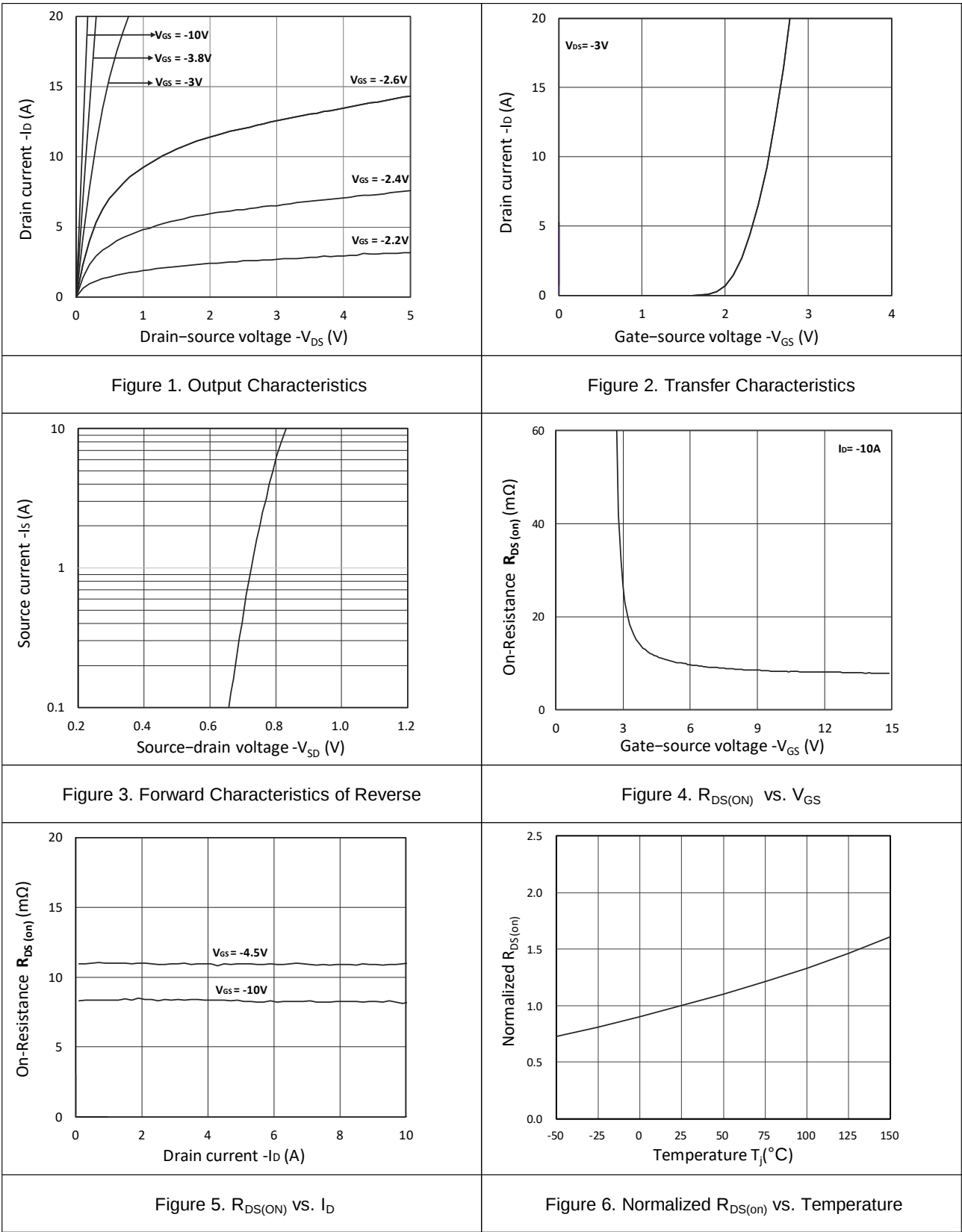
Electrical Characteristics ($T_J = 25^\circ\text{C}$, unless otherwise noted)

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	T _J =25°C	I _{DSS}	V _{DS} = -30V, V _{GS} = 0V	-	-	-1	μA
	T _J =100°C			-	-	-100	
Gate-Threshold Voltage		V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1.0	-	-2.5	V
Drain-Source On-Resistance ⁴		R _{DS(on)}	V _{GS} = -10V, I _D = -10A	-	8.2	15	mΩ
			V _{GS} = -4.5V, I _D = -10A	-	11	25	
Forward Transconductance ⁴		g _{fs}	V _{DS} = -10V, I _D = -10A	-	24	-	S
Dynamic Characteristics ⁵							
Input Capacitance		C _{iss}	V _{DS} = -15V, V _{GS} =0V, f =1MHz	-	2205	-	pF
Output Capacitance		C _{oss}		-	298	-	
Reverse Transfer Capacitance		C _{rss}		-	245	-	
Gate Resistance		R _g	f=1MHz	-	10	-	Ω
Switching Characteristics ⁵							
Total Gate Charge		Q _g	V _{GS} = -10V, V _{DS} = -15V I _D = -10A	-	30	-	nC
Gate-Source Charge		Q _{gs}		-	5	-	
Gate-Drain Charge		Q _{gd}		-	7.5	-	
Turn-On Delay Time		t _{d(on)}	V _{GS} =-10V, V _{DD} = -15V R _G = 3Ω, I _D = -10A	-	14.1	-	ns
Rise Time		t _r		-	20	-	
Turn-Off Delay Time		t _{d(off)}		-	94	-	
Fall Time		t _f		-	65	-	
Drain-source body diode Characteristics							
Diode Forward Voltage ⁴		V _{SD}	I _S = -1A, V _{GS} = 0V	-	-	-1.2	V
Continuous Source Current	T _A =25°C	I _S	-	-	-	-11.5	A

Note:

1. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 150^\circ\text{C}$
2. The EAS data shows Max. rating . The test condition is $V_{DD} = -25V, V_{GS} = -10V, L = 0.1\text{mH}, I_{AS} = -40A$
3. The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper, The value in any given application depends on the user's specific board design.
4. The data tested by pulsed , pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.
5. This value is guaranteed by design hence it is not included in the production test..

Typical Characteristics



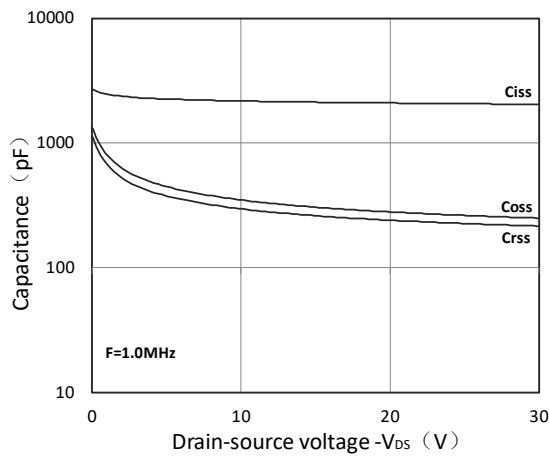


Figure 7. Capacitance Characteristics

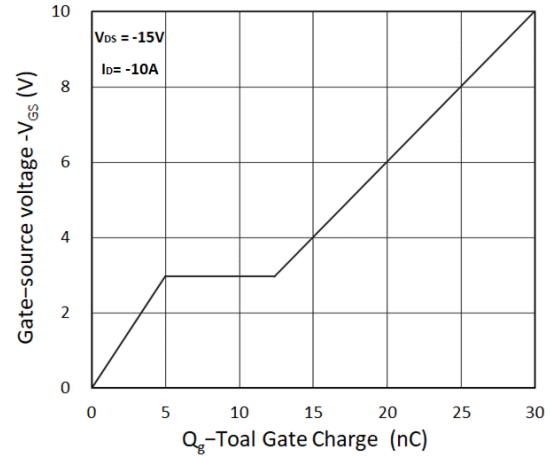


Figure 8. Gate Charge Characteristics

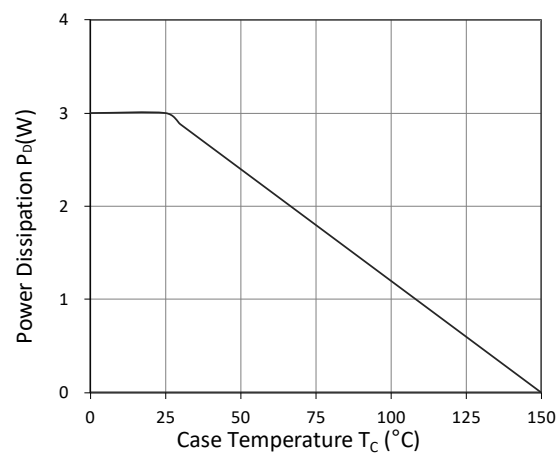


Figure 9. Power Dissipation

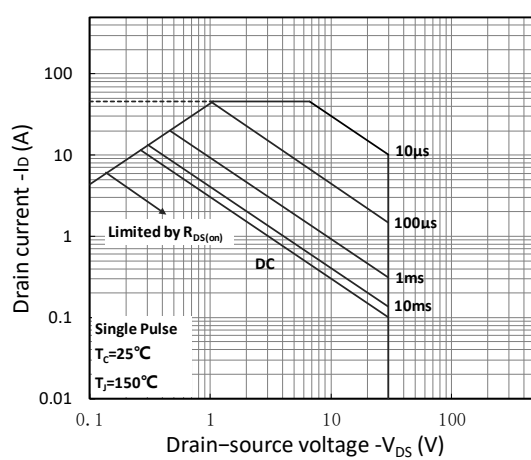


Figure10. Safe Operating Area

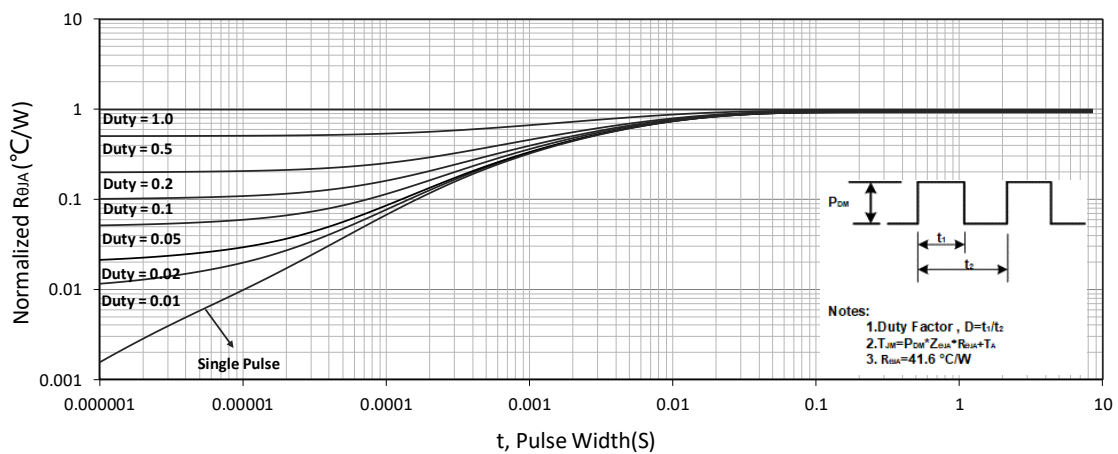


Figure 11. Normalized Maximum Transient Thermal Impedance

Test Circuit

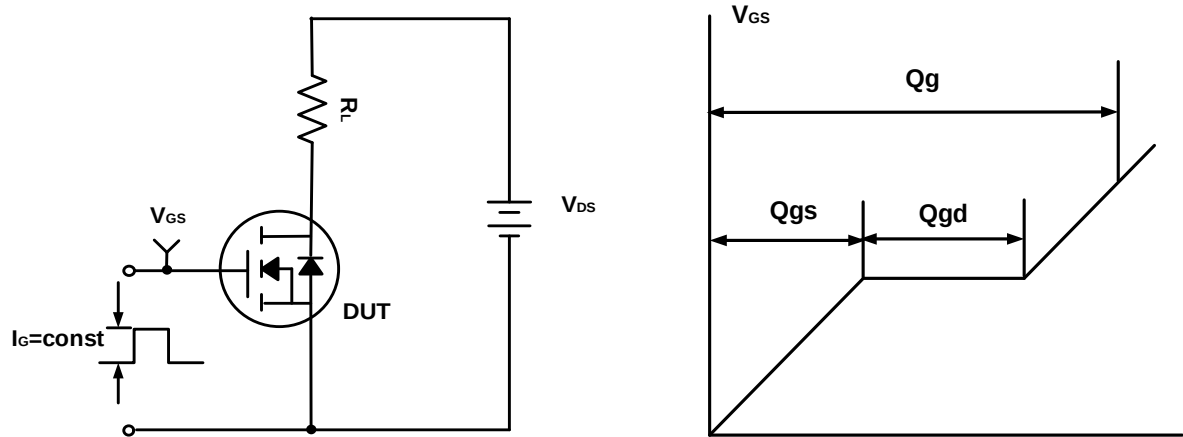


Figure A. Gate Charge Test Circuit & Waveforms

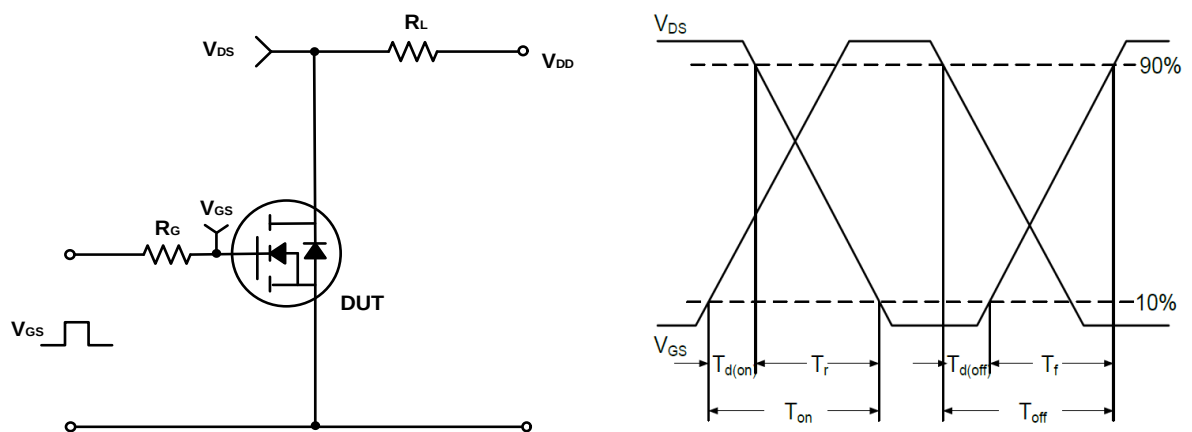


Figure B. Switching Test Circuit & Waveforms

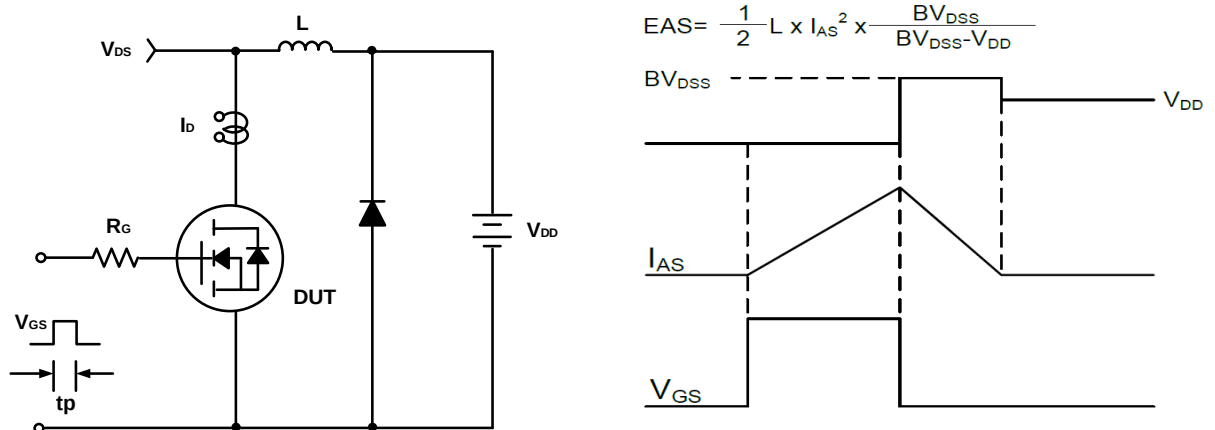


Figure C. Unclamped Inductive Switching Circuit & Waveforms

Mechanical Dimensions for SOP-8L

PACKAGE OUTLINE	SYMBOL	MM	
		MIN	MAX
	A	1.35	1.75
	a1	0.05	0.25
	b	0.31	0.51
	b1	0.16	0.25
	D	4.70	5.15
	E	5.75	6.25
	e	1.07	1.47
	F	3.70	4.10
	L	0.40	1.27

Marking Codes

Part Number	Marking Code
EMS12P03T1	S12P03 = Device code WWXX XXX= Date code

Revision History

No.	Version	Date	Revision Item	Request	Function and characteristic checking	Package dimension checking	Typos checking
1	1.0	2019-08-14	Released Version	Qi Shu Kun	Qi Shu Kun	Liu Jia Ying	Liu Jia Ying