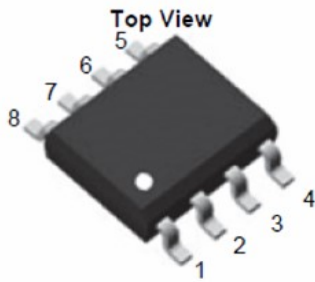
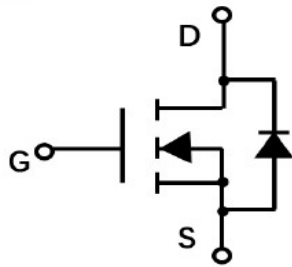
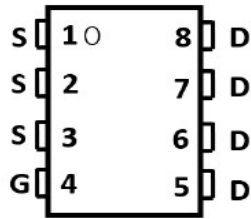


## N-Channel Enhancement Mode MOSFET



**SOP-8**



### Product Summary

- $V_{DS}$  30V
- $I_D$  12A
- $R_{DS(ON)}$  ( at  $V_{GS}= 10V$ ) < 12mohm
- $R_{DS(ON)}$  ( at  $V_{GS}= 4.5V$ ) < 15mohm

### General Description

- Trench Power LV MOSFET technology
- High density cell design for low  $R_{DS(ON)}$
- High Speed switching

### Applications

- Battery protection
- Load switch
- Power management

### ■ Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-source Voltage	$V_{DS}$	30	V
Gate-source Voltage	$V_{GS}$	$\pm 20$	V
Drain Current	$I_D$	$T_A=25^\circ\text{C}$	12
		$T_A=70^\circ\text{C}$	9.6
Pulsed Drain Current <sup>A</sup>	$I_{DM}$	50	A
Total Power Dissipation @ $T_A=25^\circ\text{C}$	$P_D$	2.5	W
Thermal Resistance Junction-to-Ambient <sup>B</sup>	$R_{\theta JA}$	50	$^\circ\text{C}/\text{W}$
Junction and Storage Temperature Range	$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

### ■ Ordering Information (Example)

PREFERRED P/N	PACKING CODE	Marking	MINIMUM PACKAGE(pcs)	INNER BOX QUANTITY(pcs)	OUTER CARTON QUANTITY(pcs)	DELIVERY MODE
LMS12N03A	F2	Q12N03.	4000			13" reel

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

Parameter	Symbol	Conditions	Min	Typ	Max	Units
<b>Static Parameter</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	30			V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=30V, V_{GS}=0V$			1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 20V, V_{DS}=0V$			$\pm 100$	nA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.5	V
Static Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=12A$		7	12	m $\Omega$
		$V_{GS}=4.5V, I_D=8.0A$		11	15	
Diode Forward Voltage	$V_{SD}$	$I_S=12A, V_{GS}=0V$		0.85	1.2	V
Maximum Body-Diode Continuous Current	$I_S$				12	A
<b>Dynamic Parameters</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V, f=1\text{MHz}$		1015		pF
Output Capacitance	$C_{oss}$			201		
Reverse Transfer Capacitance	$C_{rss}$			164		
<b>Switching Parameters</b>						
Total Gate Charge	$Q_g$	$V_{GS}=10V, V_{DS}=20V, I_D=20A$		23.6		nC
Gate Source Charge	$Q_{gs}$			3.9		
Gate Drain Charge	$Q_{gd}$			7.0		
Reverse Recovery Charge	$Q_{rr}$	$I_F=15A, di/dt=100A/us$		0.2		ns
Reverse Recovery Time	$t_{rr}$			5		
Turn-on Delay Time	$t_{D(on)}$	$V_{GS}=10V, V_{DD}=20V, I_D=2A, R_{GEN}=3\Omega$		7		ns
Turn-on Rise Time	$t_r$			19		
Turn-off Delay Time	$t_{D(off)}$			24		
Turn-off Fall Time	$t_f$			24		

A. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty cycle  $\leq 2\%$ .

B.  $R_{\theta JA}$  is the sum of the junction-to-Lead and Lead-to-ambient thermal resistance, where the Lead thermal reference is defined as the solder mounting surface of the drain pins.  $R_{\theta JL}$  is guaranteed by design, while  $R_{\theta JA}$  is determined by the board design. The maximum rating presented here is based on mounting on a 1 in 2 pad of 2oz copper.

■ Typical Performance Characteristics

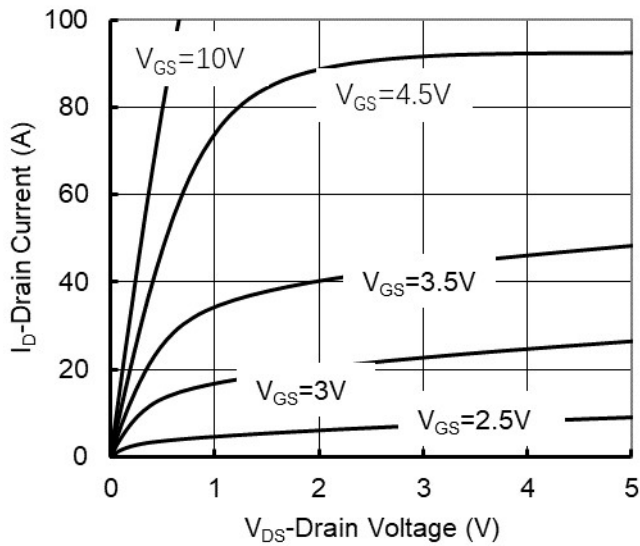


Figure1. Output Characteristics

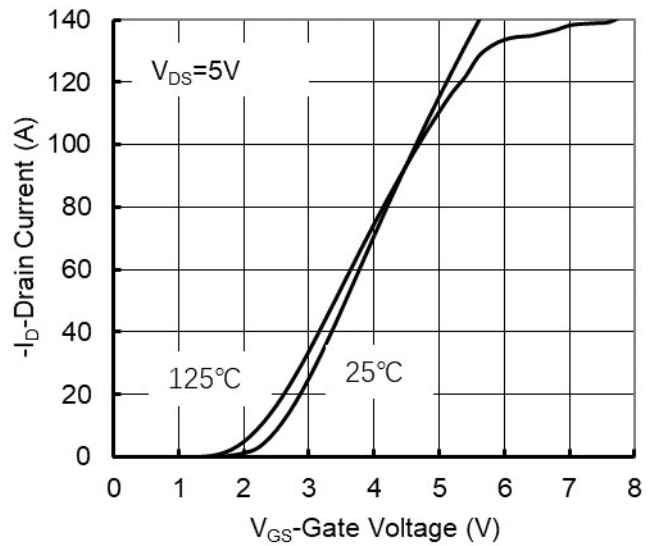


Figure2. Transfer Characteristics

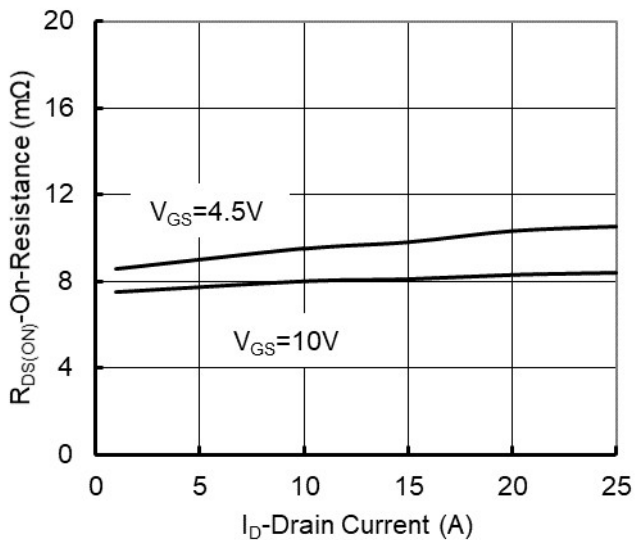


Figure 3: On-Resistance vs. Drain Current and Gate Voltage

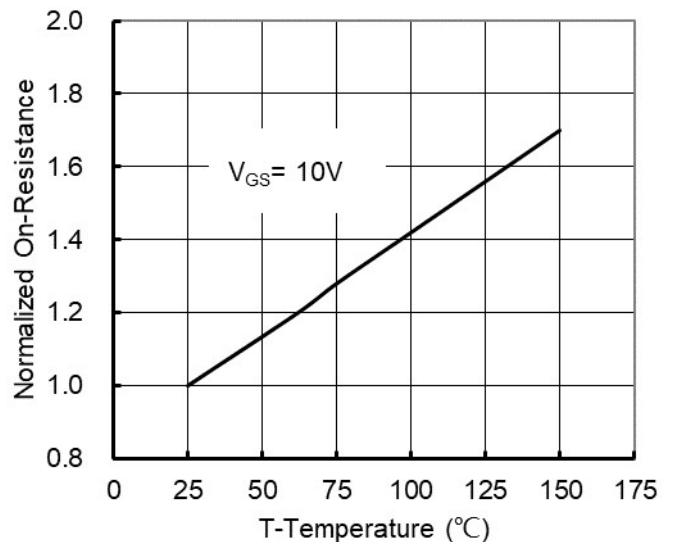


Figure 4: On-Resistance vs. Junction Temperature

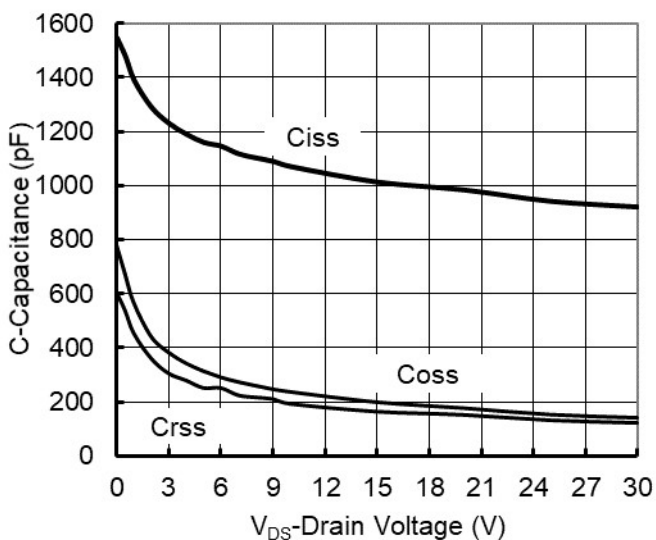


Figure5. Capacitance Characteristics

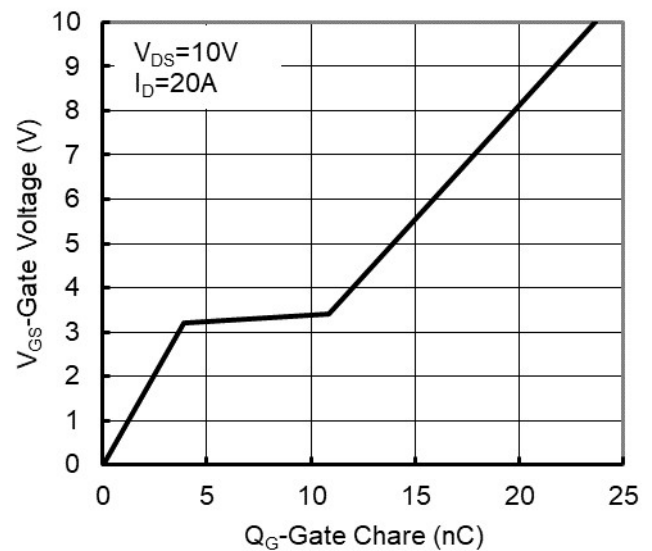


Figure6. Gate Charge

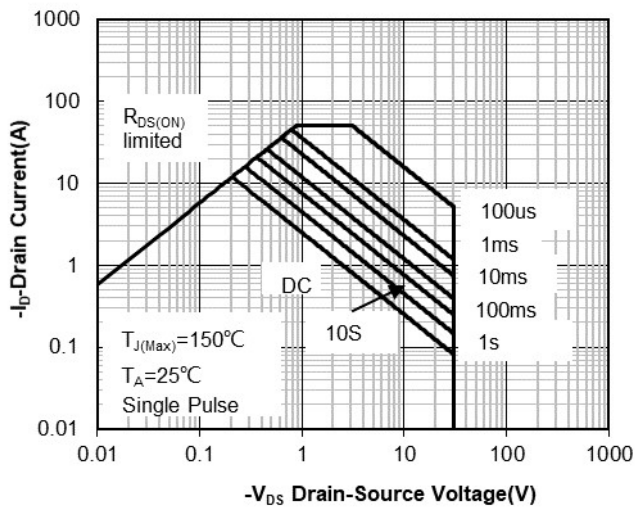


Figure7. Safe Operation Area

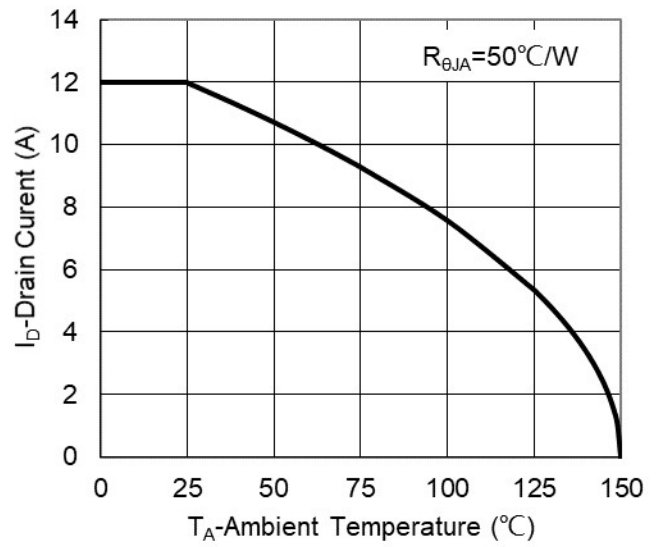


Figure8. Maximum Continuous Drain Current vs Ambient Temperature

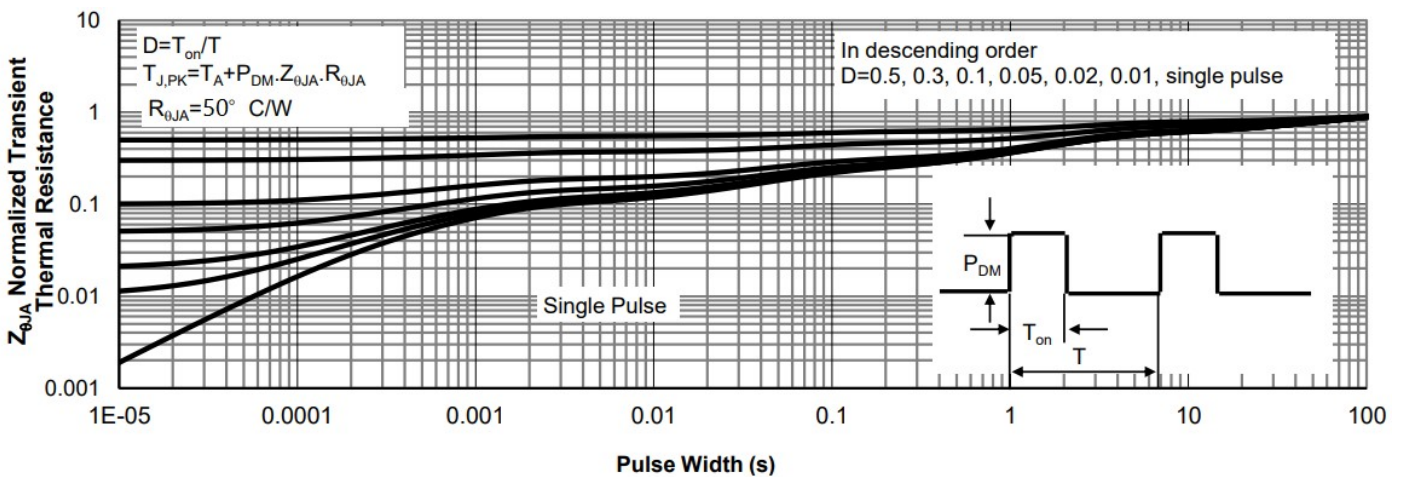
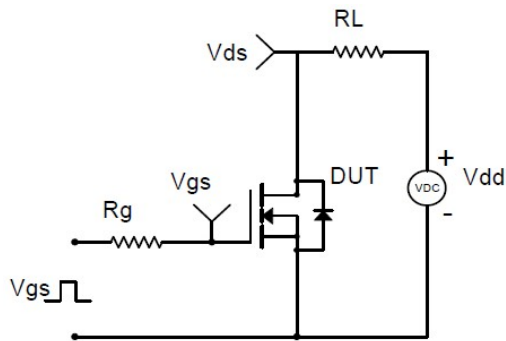
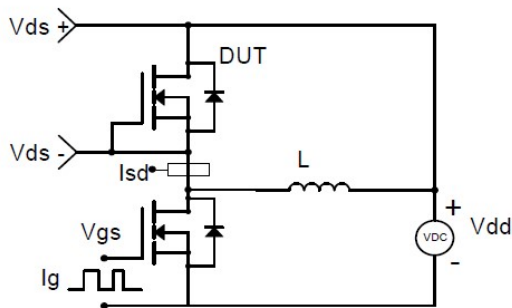


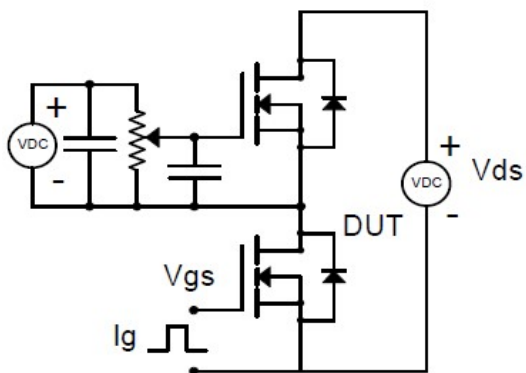
Figure9. Normalized Maximum Transient Thermal Impedance



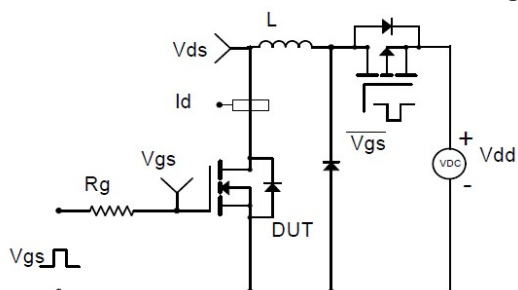
**Resistive Switching Test Circuit & Waveforms**



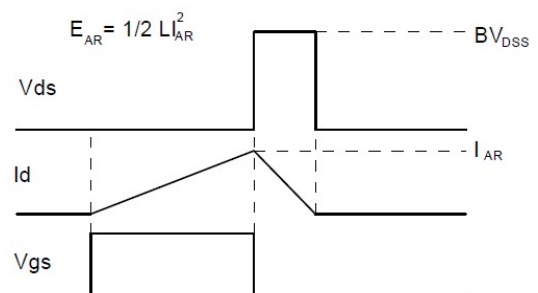
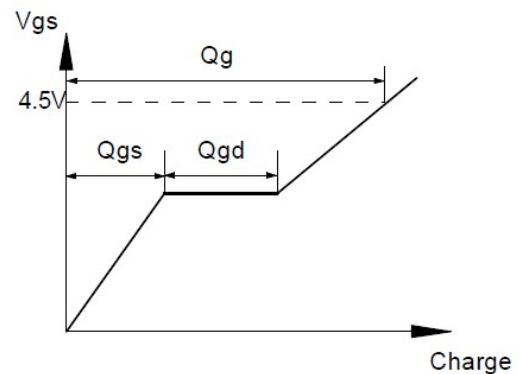
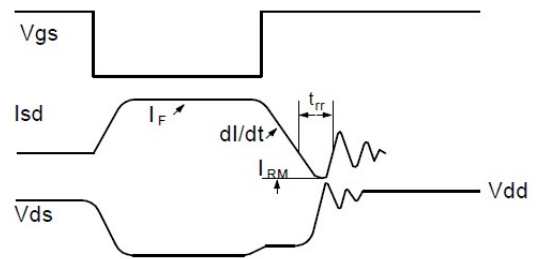
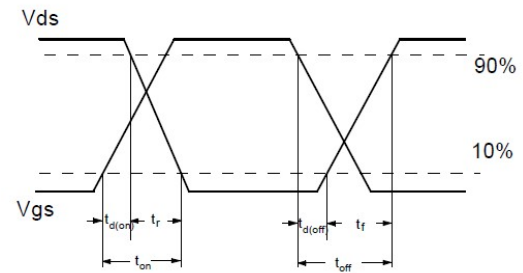
**Diode Recovery Test Circuit & Waveforms**



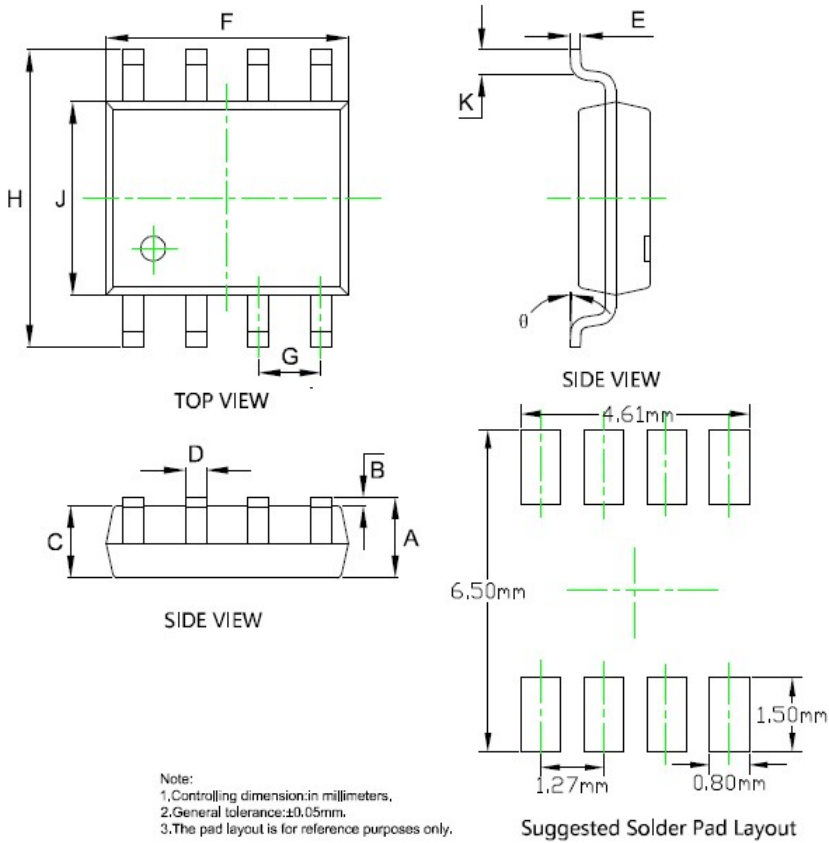
**Gate Charge Test Circuit & Waveform**



**Unclamped Inductive Switching (UIS) Test Circuit & Waveforms**



## ■SOP-8 Package information



SYMBOL	DIMENSIONS			
	INCHES		Millimeter	
	MIN.	MAX.	MIN.	MAX.
A	0.053	0.069	1.350	1.750
B	0.004	0.010	0.100	0.250
C	0.053	0.061	1.350	1.550
D	0.013	0.020	0.330	0.510
E	0.007	0.010	0.170	0.250
F	0.189	0.197	4.800	5.000
G	0.050BSC		1.270BSC	
H	0.228	0.244	5.800	6.200
J	0.150	0.157	3.800	4.000
K	0.016	0.050	0.400	1.270
$\theta$	0°	8°	0°	8°