KERSEMI ELECTRONIC CO.,LTD.

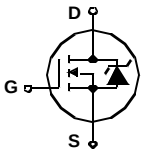
KSMD60N03L

N-Channel Logic Level MOSFETs
30V, 30A, 0.023Ω

Features

- Fast switching
- $r_{DS(ON)}$ = 0.014Ω (Typ), V_{GS} = 10V
- $r_{DS(ON)}$ = 0.024Ω (Typ), V_{GS} = 4.5V
- Q_g (Typ) = 9.6nC, V_{GS} = 5V
- Q_{gd} (Typ) = 3.4nC
- C_{ISS} (Typ) = 900pF

TO-252AA



General Description

This device employs advanced MOSFET technology and features low gate charge while maintaining low on-resistance.

Optimized for switching applications, this device improves the overall efficiency of DC/DC converters and allows operation to higher switching frequencies.

Applications

- DC/DC converters

MOSFET Maximum Ratings T_C=25°C unless otherwise noted

Symbol	Parameter	Ratings	Units
V_{DSS}	Drain to Source Voltage	30	V
V_{GS}	Gate to Source Voltage	±20	V
I_D	Drain Current Continuous (T_C = 25°C, V_{GS} = 10V)	30	A
	Continuous (T_C = 100°C, V_{GS} = 4.5V)	19	A
	Continuous (T_C = 25°C, V_{GS} = 10V, $R_{\theta JA}$= 52°C/W)	7.9	A
	Pulsed	Figure 4	A
P_D	Power dissipation Derate above 25°C	45 0.37	W W/°C
T_J, T_{STG}	Operating and Storage Temperature	-55 to 150	°C

Thermal Characteristics

$R_{\theta JC}$	Thermal Resistance Junction to Case TO-252	2.73	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252	100	°C/W
$R_{\theta JA}$	Thermal Resistance Junction to Ambient TO-252, 1in^2 copper pad area	52	°C/W

Package Marking and Ordering Information

Device Marking	Device	Package	Reel Size	Tape Width	Quantity
KSMD60N03L	KSMD60N03L	TO-252AA	330mm	16mm	2500 units

Electrical Characteristics T_C = 25°C unless otherwise noted

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
B_{VDSS}	Drain to Source Breakdown Voltage	I_D = 250μA, V_{GS} = 0V	30	-	-	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 25V	-	-	1	μA
		V_{GS} = 0V, T_C = 125°C	-	-	250	
I_{GSS}	Gate to Source Leakage Current	V_{GS} = ±20V	-	-	±100	nA
On Characteristics						
$V_{GS(TH)}$	Gate to Source Threshold Voltage	V_{GS} = V_{DS}, I_D = 250μA	1	-	3	V
$r_{DS(ON)}$	Drain to Source On Resistance	I_D = 30A, V_{GS} = 10V	-	0.014	0.023	Ω
		I_D = 19A, V_{GS} = 4.5V	-	0.024	0.030	
Dynamic Characteristics						
C_{ISS}	Input Capacitance	V_{DS} = 15V, V_{GS} = 0V, f = 1MHz	-	900	-	pF
C_{OSS}	Output Capacitance		-	210	-	pF
C_{RSS}	Reverse Transfer Capacitance		-	90	-	pF
$Q_{g(TOT)}$	Total Gate Charge at 10V	V_{GS} = 0V to 10V; V_{DD} = 15V, I_D = 19A, I_g = 1.0mA	-	18	28	nC
$Q_{g(5)}$	Total Gate Charge at 5V	V_{GS} = 0V to 5V	-	9.6	14	nC
$Q_{g(TH)}$	Threshold Gate Charge	V_{GS} = 0V to 1V	-	1.0	1.5	nC
Q_{gs}	Gate to Source Gate Charge		-	3.4	-	nC
Q_{gd}	Gate to Drain “Miller” Charge		-	3.4	-	nC
Switching Characteristics (V_{GS} = 4.5V)						
t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 7.9A, V_{GS} = 4.5V, R_{GS} = 18Ω	-	-	90	ns
$t_{d(ON)}$	Turn-On Delay Time		-	11	-	ns
t_r	Rise Time		-	49	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	27	-	ns
t_f	Fall Time		-	28	-	ns
t_{OFF}	Turn-Off Time		-	-	83	ns
Switching Characteristics (V_{GS} = 10V)						
t_{ON}	Turn-On Time	V_{DD} = 15V, I_D = 7.9A, V_{GS} = 10V, R_{GS} = 18 Ω	-	-	48	ns
$t_{d(ON)}$	Turn-On Delay Time		-	6	-	ns
t_r	Rise Time		-	26	-	ns
$t_{d(OFF)}$	Turn-Off Delay Time		-	52	-	ns
t_f	Fall Time		-	28	-	ns
t_{OFF}	Turn-Off Time		-	-	120	ns
Unclamped Inductive Switching						
t_{AV}	Avalanche Time	I_D = 2.7 A, 3.0 mH	180	-	-	μs
Drain-Source Diode Characteristics						
V_{SD}	Source to Drain Diode Voltage	I_{SD} = 19A	-	-	1.25	V
		I_{SD} = 10A	-	-	1.0	V
t_{rr}	Reverse Recovery Time	I_{SD} = 19A, dI_{SD}/dt = 100A/μs	-	-	58	ns
Q_{RR}	Reverse Recovered Charge	I_{SD} = 19A, dI_{SD}/dt = 100A/μs	-	-	70	nC

Typical Characteristic

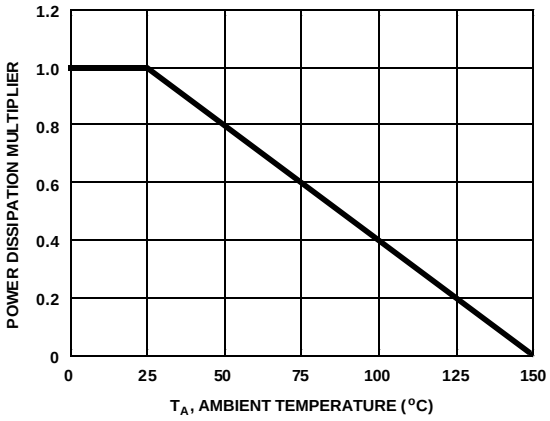


Figure 1. Normalized Power Dissipation vs Ambient Temperature

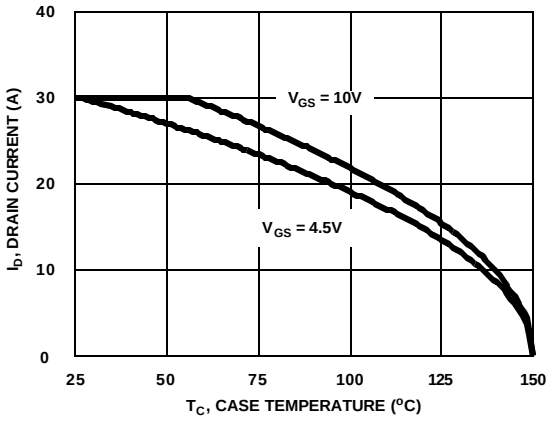


Figure 2. Maximum Continuous Drain Current vs Case Temperature

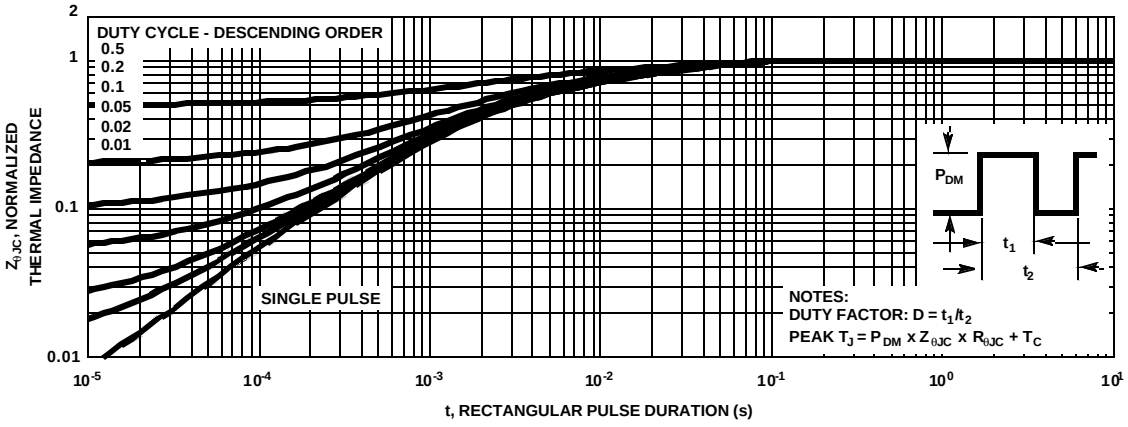


Figure 3. Normalized Maximum Transient Thermal Impedance

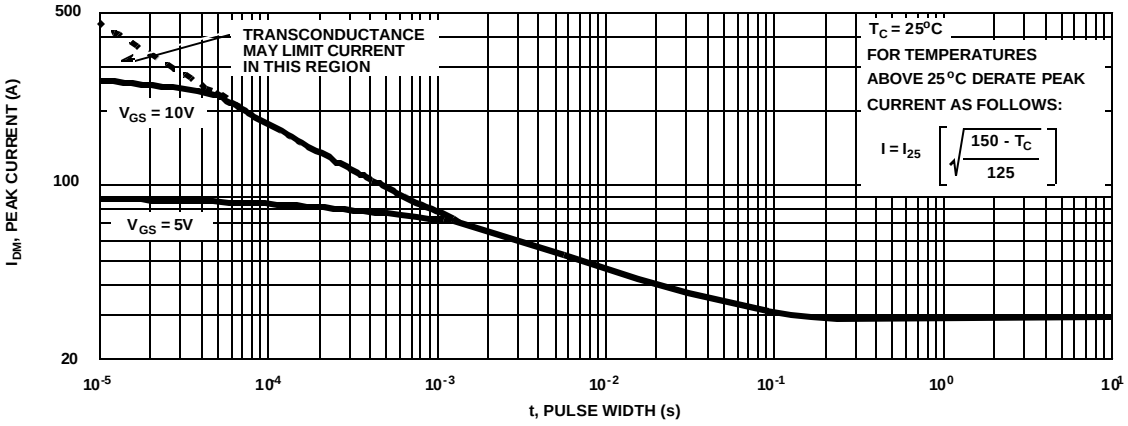


Figure 4. Peak Current Capability

Typical Characteristic (Continued)

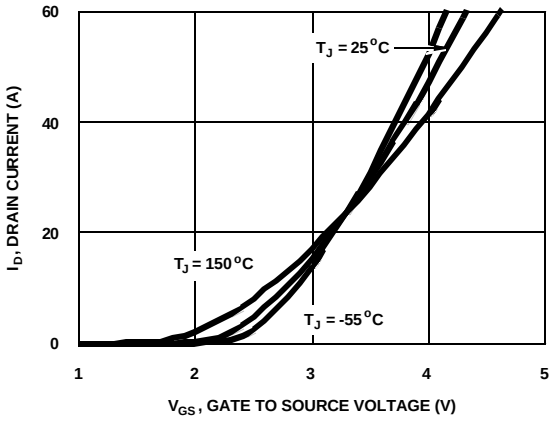


Figure 5. Transfer Characteristics

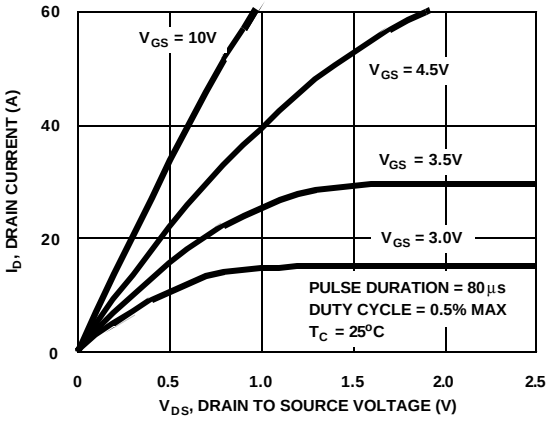


Figure 6. Saturation Characteristics

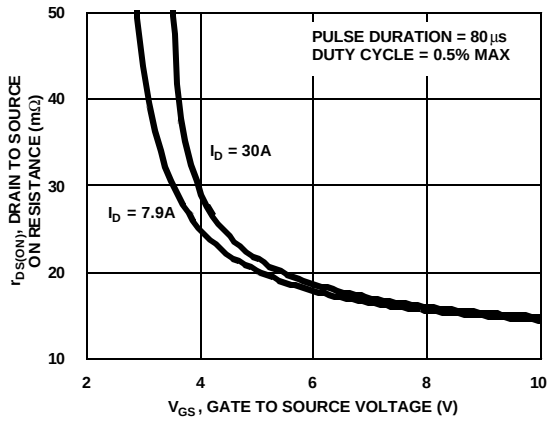


Figure 7. Drain to Source On Resistance vs Gate Voltage and Drain Current

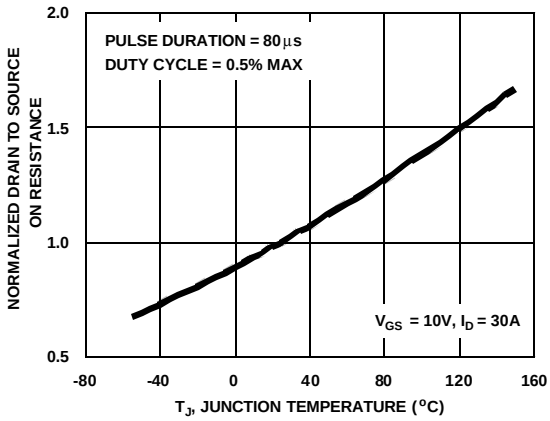


Figure 8. Normalized Drain to Source On Resistance vs Junction Temperature

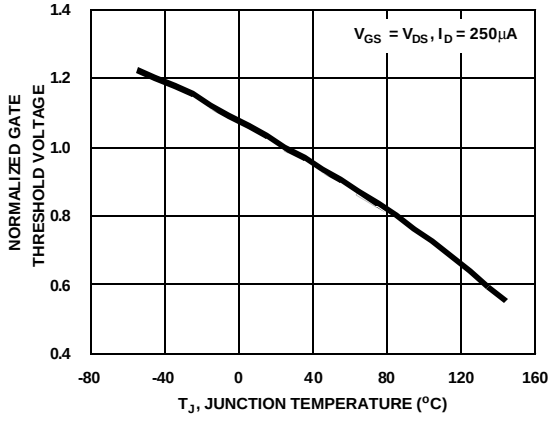


Figure 9. Normalized Gate Threshold Voltage vs Junction Temperature

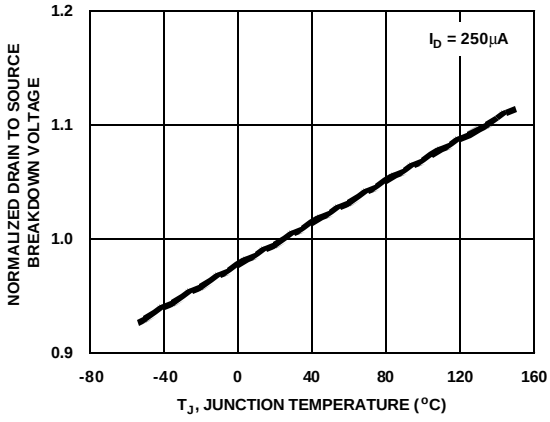


Figure 10. Normalized Drain to Source Breakdown Voltage vs Junction Temperature

Typical Characteristic (Continued)

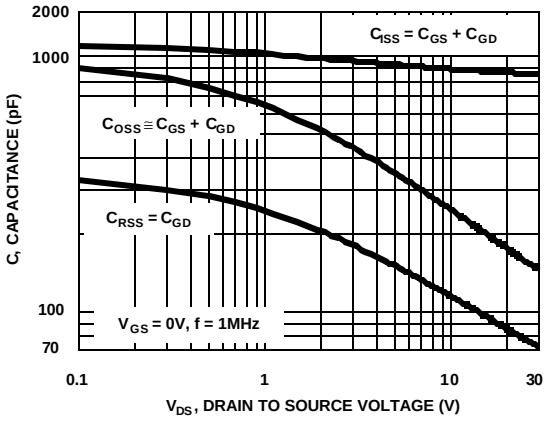


Figure 11. Capacitance vs Drain to Source Voltage

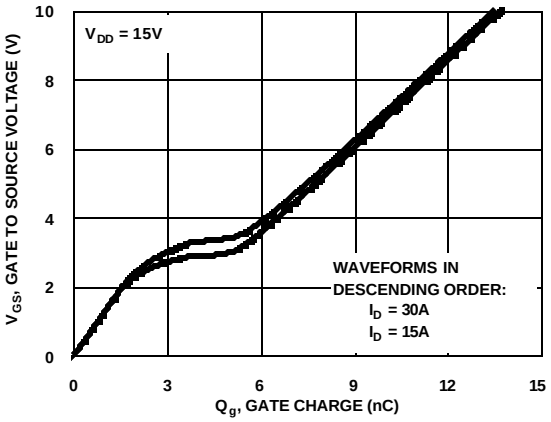


Figure 12. Gate Charge Waveforms for Constant Gate Currents

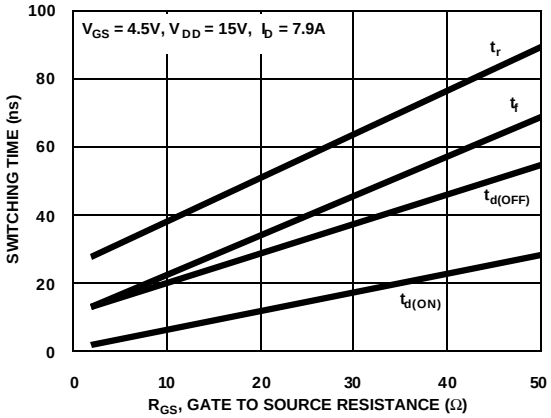


Figure 13. Switching Time vs Gate Resistance

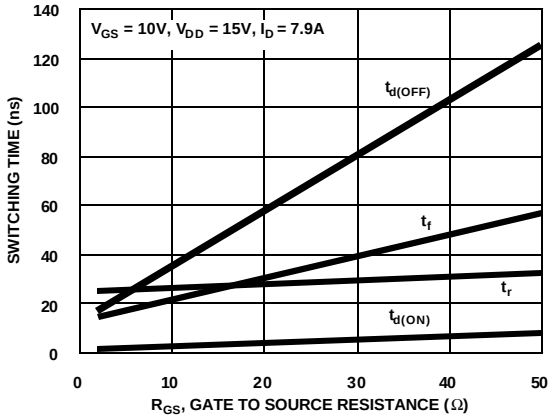


Figure 14. Switching Time vs Gate Resistance

Test Circuits and Waveforms

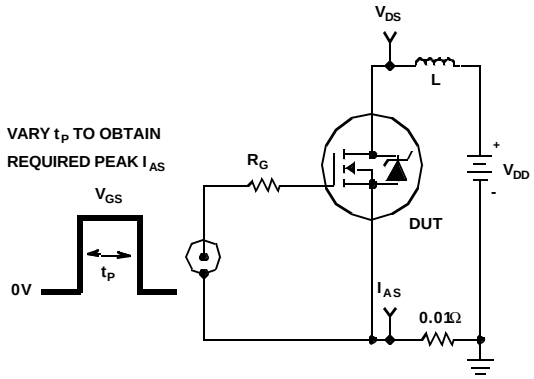


Figure 15. Unclamped Energy Test Circuit

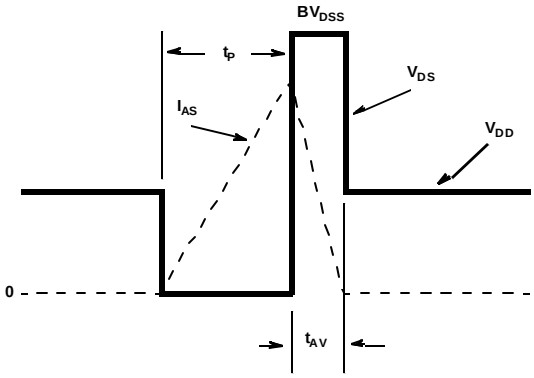


Figure 16. Unclamped Energy Waveforms

Test Circuits and Waveforms (Continued)

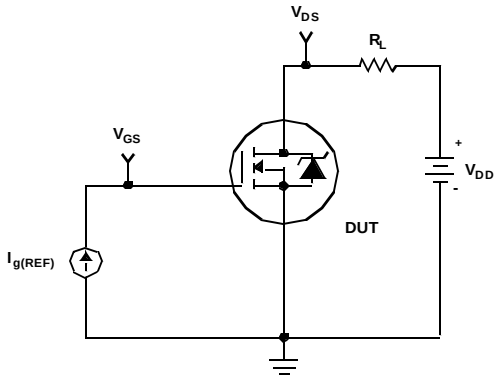


Figure 17. Gate Charge Test Circuit

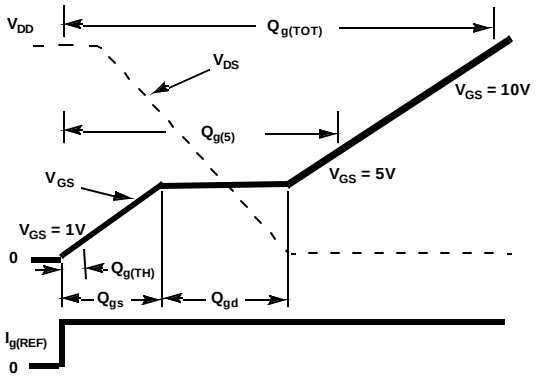


Figure 18. Gate Charge Waveforms

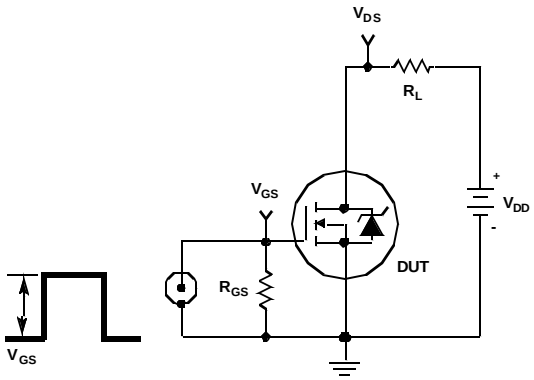


Figure 19. Switching Time Test Circuit

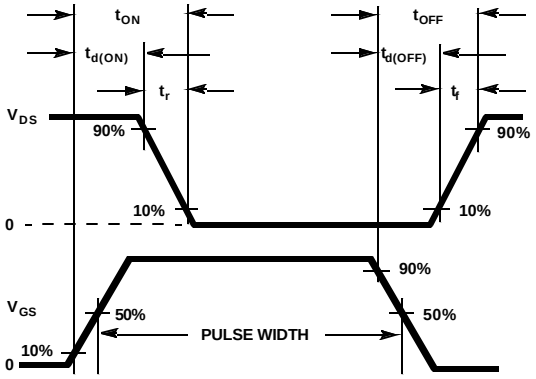


Figure 20. Switching Time Waveforms