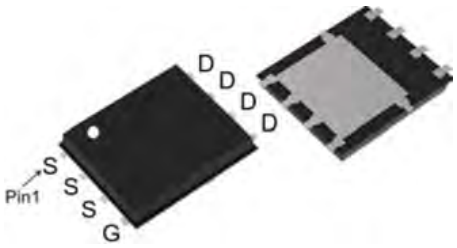
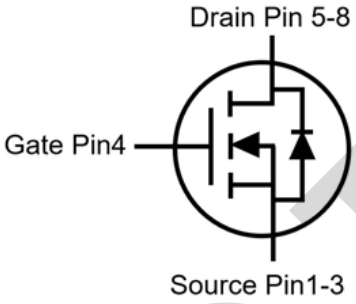
Trench N-channel Power MOSFET

MSR8R5N03D33

PDFN3*3





V_{DS}	30	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	6.3	mΩ
I_D	56	A

Features

1、Low on – resistance
2、Package PDFN3*3
3、Trench N-channel Power MOSFET
4、Halogen free

Applications

1、Load Switch for Portable Devices
2、DC/DC Converter

Maximum ratings, at T_A =25°C, unless otherwise specified

Symbol	Parameter		Rating	Unit
$V_{(BR)DSS}$	Drain-Source breakdown voltage		30	V
V_{GS}	Gate-Source voltage		±20	V
I_S	Diode continuous forward current	T_C =25°C	56	A
I_D	Continuous drain current @VGS=10V	T_C =25°C	56	A
		T_C =70°C	44	A
I_{DM}	Pulse drain current tested ①	T_C =25°C	160	A
EAS	Avalanche energy, single pulsed ②		135	mJ
P_D	Maximum power dissipation	T_C =25°C	41	W
T_{STG},T_J	Storage and Junction Temperature Range		-55 to 150	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	3.0	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	60	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @ T_j=25°C (unless otherwise stated)						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=250μA	30	--	--	V
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=30V,V_{GS}=0V	--	--	1	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V	--	--	±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	1.0	1.6	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=16A	--	6.3	8.5	mΩ
		V_{GS}=4.5V, I_D=8A	--	9.0	13	mΩ
Dynamic Electrical Characteristics @ T_j = 25°C (unless otherwise stated)						
C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V , f=1MHz	--	809	--	pF
C_{oss}	Output Capacitance		--	148	--	pF
C_{rss}	Reverse Transfer Capacitance		--	90	--	pF
Q_g (10V)	Total Gate Charge	V_{DS}=15V,I_D=15A , V_{GS}=10V	--	14.6	--	nC
Q_{gs}	Gate-Source Charge		--	1.9	--	nC
Q_{gd}	Gate-Drain Charge		--	3.1	--	nC

Switching Characteristics

Td(on)	Turn-on Delay Time	V_{DD}=15V, VGS=10V, R_G=3.3Ω, I_D=15A	--	10	--	ns
Tr	Turn-on Rise Time		--	21	--	ns
Td(off)	Turn-Off Delay Time		--	32	--	ns
Tf	Turn-Off Fall Time		--	12	--	ns

Source- Drain Diode Characteristics@ T_j = 25°C (unless otherwise stated)

trr	Reverse Recovery Time	I_{SD}=30A, V_{GS}=0V di/dt=100A/μs	--	31	--	nS
Qrr	Reverse Recovery Charge		--	17	--	nC
V_{SD}	Forward on voltage	I_{SD}=16A,V_{GS}=0V	--	0.83	1.2	V

NOTE: ① Repetitive rating; pulse width limited by max junction temperature.

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.3mH, R_G = 25Ω, I_{AS} = 30A, V_{GS} =10V. Part not recommended for use above this value

③ The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C.

④ Pulse width ≤ 380μs; duty cycle≤ 2%.

Typical Characteristics

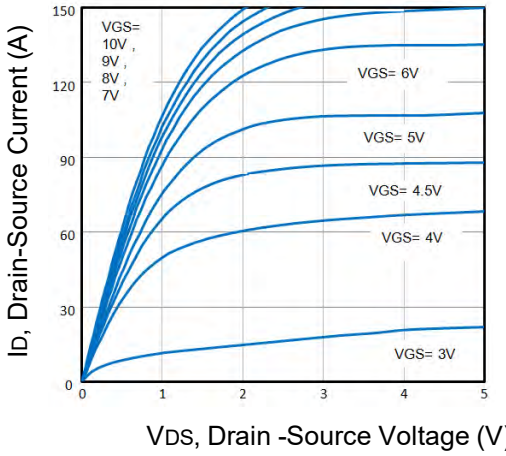


Fig1. Typical Output Characteristics

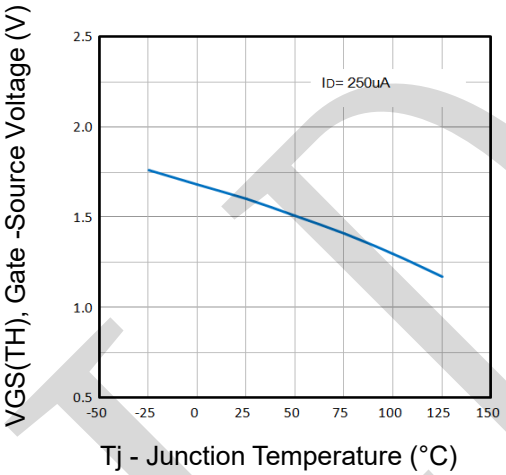


Fig2. VGS(TH) Voltage Vs. Temperature

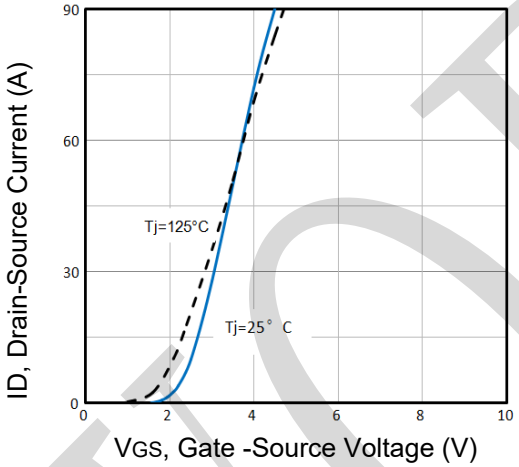


Fig3. Typical Transfer Characteristics

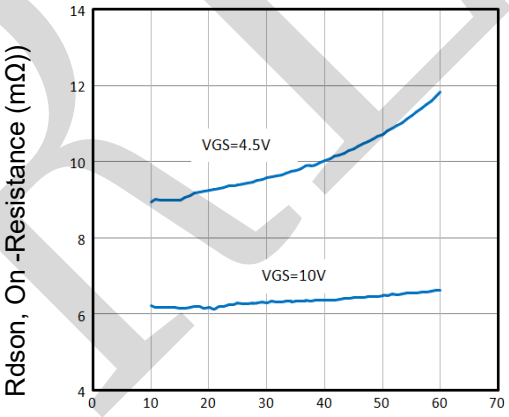


Fig4. On-Resistance vs. Drain Current and Gate Voltage

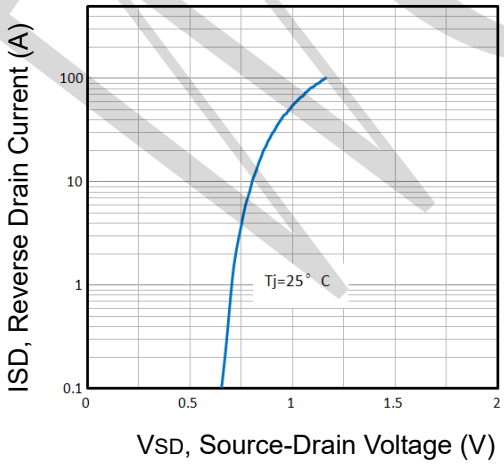


Fig5. Typical Source-Drain Diode Forward Voltage

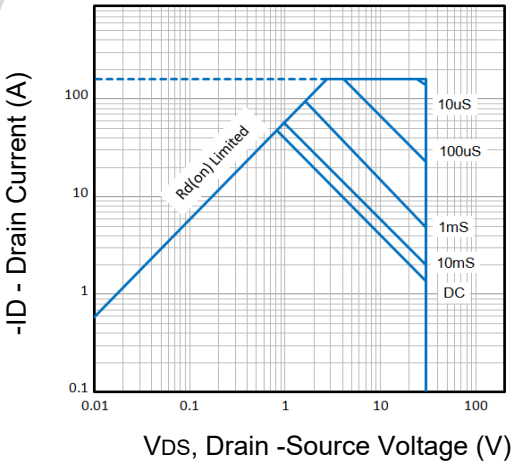


Fig6. Maximum Safe Operating Area

Typical Characteristics

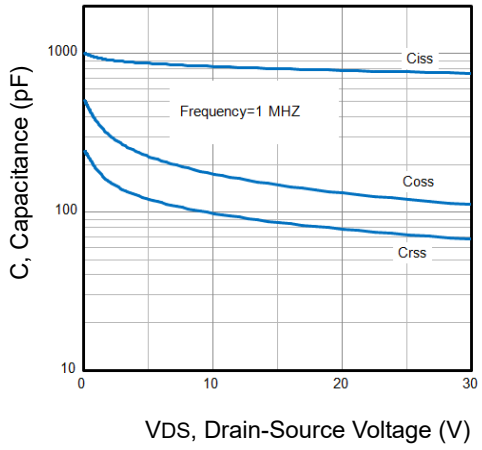


Fig7. Typical Capacitance Vs. Drain-Source Voltage

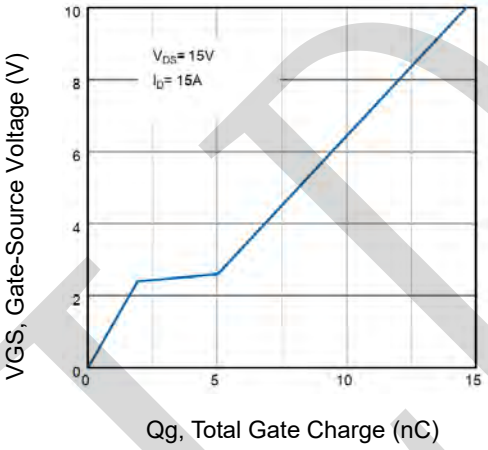


Fig8. Typical Gate Charge Vs. Gate-Source Voltage

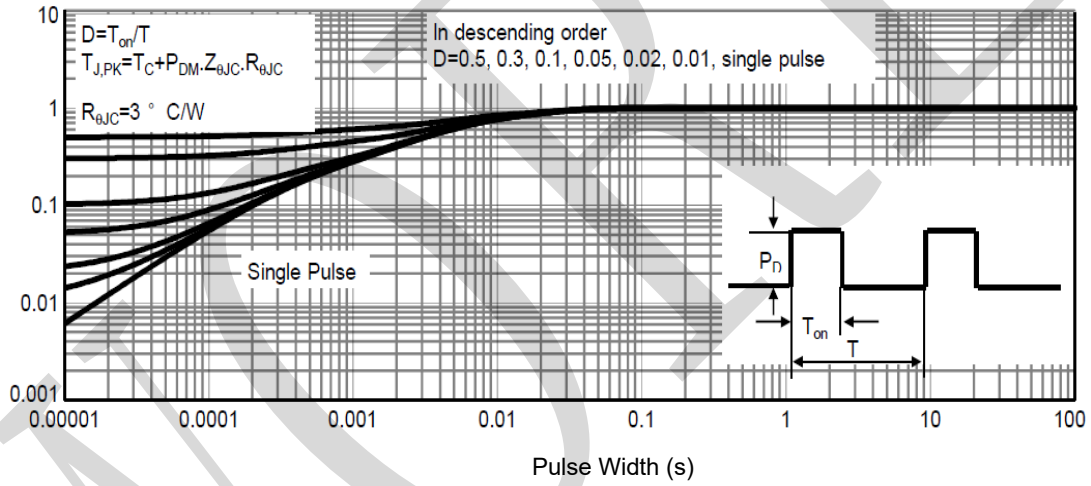


Fig9. Normalized Maximum Transient Thermal Impedance

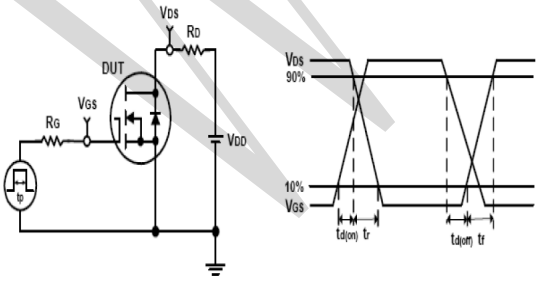


Fig10. Switching Time Test Circuit and waveforms

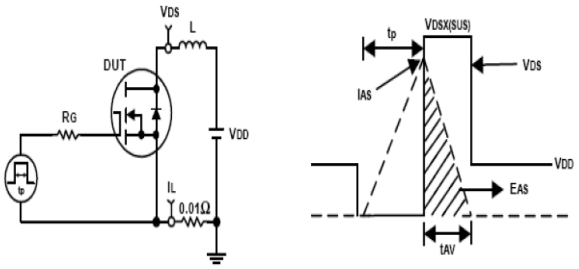
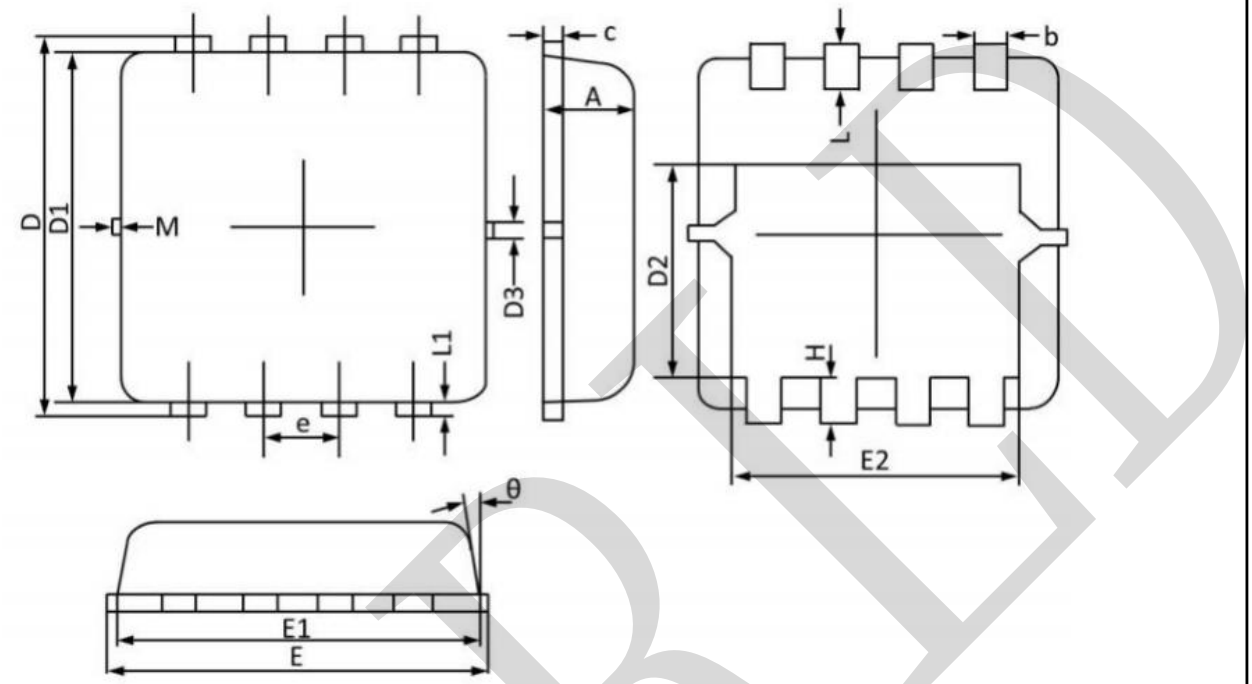


Fig11. Unclamped Inductive Test Circuit and waveforms

PACKAGE OUTLINE DIMENSIONS



unit : mm

Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	0.70	0.75	0.80	**b**	0.25	0.30	0.35
C	0.10	0.15	0.25	**D**	3.25	3.35	3.45
D1	3.00	3.10	3.20	**D2**	1.78	1.88	1.98
D3	--	0.13	--	**E**	3.20	3.30	3.40
E1	3.00	3.15	3.20	**E2**	2.39	2.49	2.59
e		0.65BSC		**H**	0.30	0.39	0.50
L	0.30	0.40	0.50	**L1**	--	0.13	--
θ	--	10°	12°	**M**	*	*	0.15