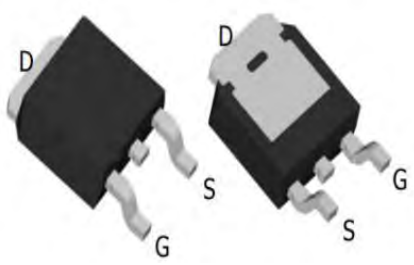
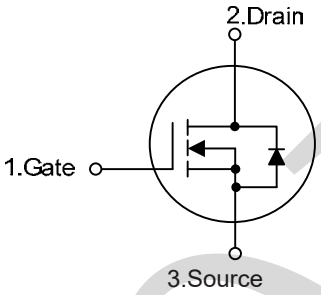
Trench N-channel Power MOSFET

MSR4R5N03D

TO-252





V_{DS}	30	V
$R_{DS(on),TYP}$@ V_{GS}=10 V	3.7	mΩ
I_D	90	A

Features

1、Low on – resistance

2、Package TO-252

3、TrenchFET Power MOSFET

Applications

1、Load Switch for Portable Devices

2、DC/DC Converter

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

Symbol	Parameter		Rating	Unit
V(BR)DSS	Drain-Source breakdown voltage		30	V
VGS	Gate-Source voltage		±20	V
IS	Diode continuous forward current	T_C =25°C	--	A
ID	Continuous drain current @VGS=10V	T_C =25°C	90	A
IDM	Pulse drain current tested ①	T_C =25°C	360	A
EAS	Avalanche energy, single pulsed ②		270	mJ
PD	Maximum power dissipation	T_C =25°C	81	W
TSTG,TJ	Storage and Junction Temperature Range		-55 to 175	°C

Thermal Characteristics

Symbol	Parameter	Typical	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	1.85	°C/W

Electrical Characteristics

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
Static Electrical Characteristics @Tj=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	1.5	2.5	V
$R_{DS(on)}$	Drain-Source On-State Resistance ④	V_{GS}=10V, I_D=30A	--	3.7	4.5	mΩ
		V_{GS}=4.5V, I_D=30A	--	6.6	7.9	mΩ

Dynamic Electrical Characteristics@Tj = 25°C (unless otherwise stated)

C_{iss}	Input Capacitance	V_{DS}=15V,V_{GS}=0V, f=1MHz	--	2153	--	pF
C_{oss}	Output Capacitance		--	327	--	pF
C_{rss}	Reverse Transfer Capacitance		--	287	--	pF
gfs	Forward Transconductance	VDS = 5 V, ID = 24A	20	--	--	S
Q_g (10V)	Total Gate Charge	V_{DS}=25V,I_D=30A , V_{GS}=10V	--	45	--	nC
Q_{gs}	Gate-Source Charge		--	3	--	nC
Q_{gd}	Gate-Drain Charge		--	15	--	nC
R_G	Gate resistance	V_{GS}=0V,V_{DS}=0V, f=1MHz	--	1.8	--	Ω

Switching Characteristics

Td(on)	Turn-on Delay Time	V_{DS}=15V, IDS=30A, R_L=3.0Ω, Tj=25°C	--	21	--	ns
Tr	Turn-on Rise Time		--	32	--	ns
Td(off)	Turn-Off Delay Time		--	59	--	ns
Tf	Turn-Off Fall Time		--	34	--	ns

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

V_{SD}	Forward on voltage	I_{SD}=30A,V_{GS}=0V	--	0.86	1.0	V
Trr	Reverse Recovery Time (Note1)	I_{sd}=40A , V_{GS}=0V di/dt=100A/μs	--	15	--	ns
Qrr	Reverse Recovery Charge (Note1)		--	4	--	nC

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

② Limited by T_{Jmax}, starting T_J = 25°C, L = 0.5mH, R_G = 25Ω, I_{AS} = 9A, 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 ≤ 300μs; duty cycle≤ 2%.

Typical Characteristics

Figure1: Output Characteristics

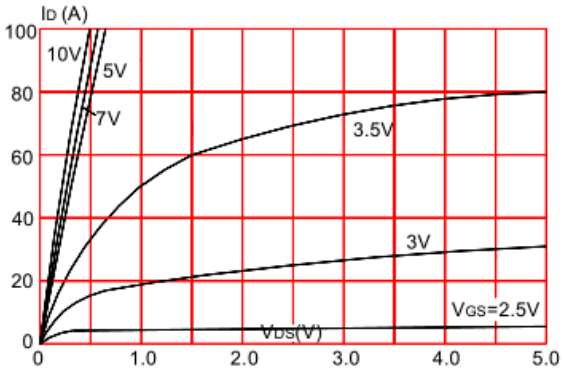


Figure 2: Typical Transfer Characteristics

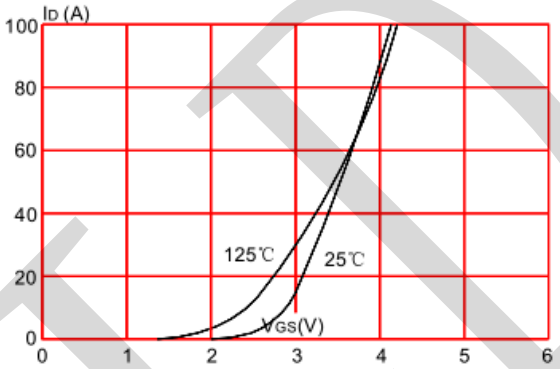


Figure 3: On-resistance vs. Drain Current

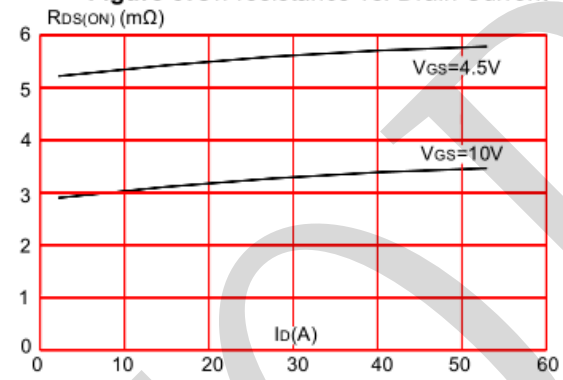


Figure 4: Body Diode Characteristics

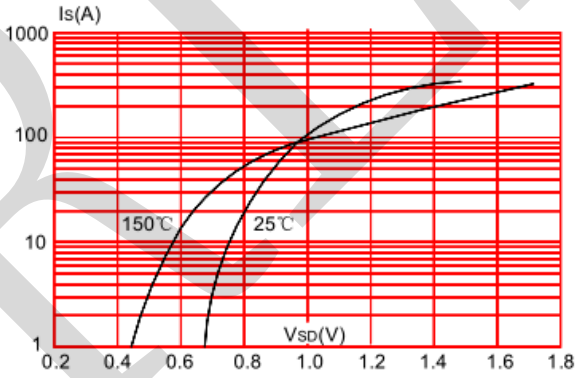


Figure 5: Gate Charge Characteristics

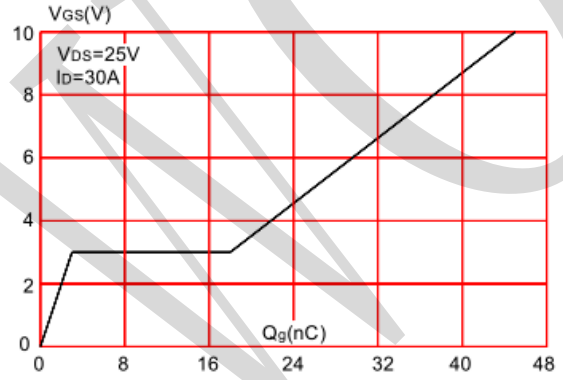
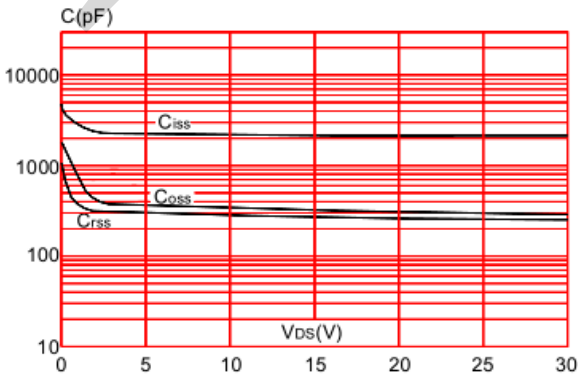


Figure 6: Capacitance Characteristics



Typical Characteristics

Figure 7: Normalized Breakdown Voltage vs. Junction Temperature

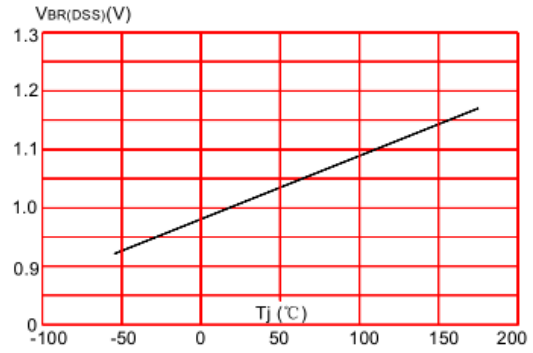


Figure 8: Normalized on Resistance vs. Junction Temperature

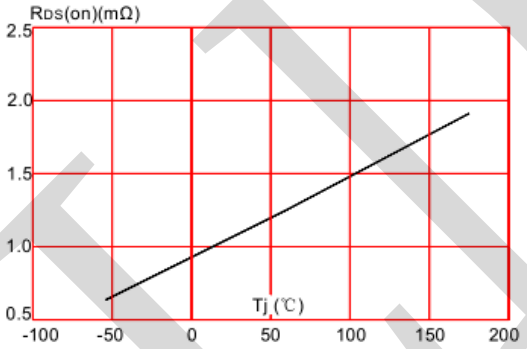


Figure 9: Maximum Safe Operating Area

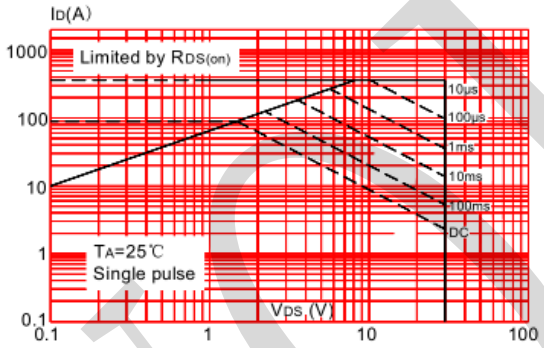


Figure 10: Maximum Continuous Drain Current vs. Case Temperature

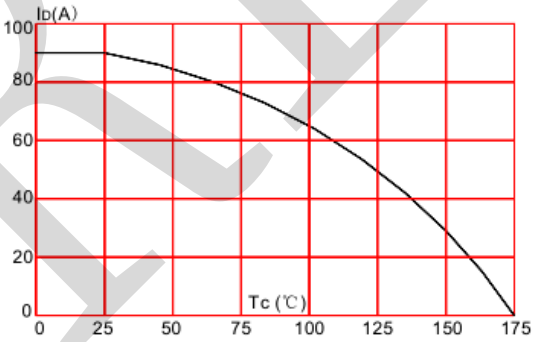
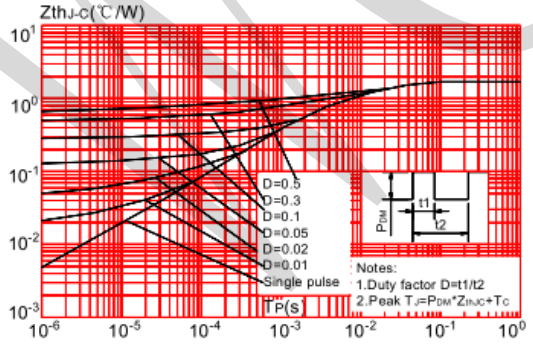


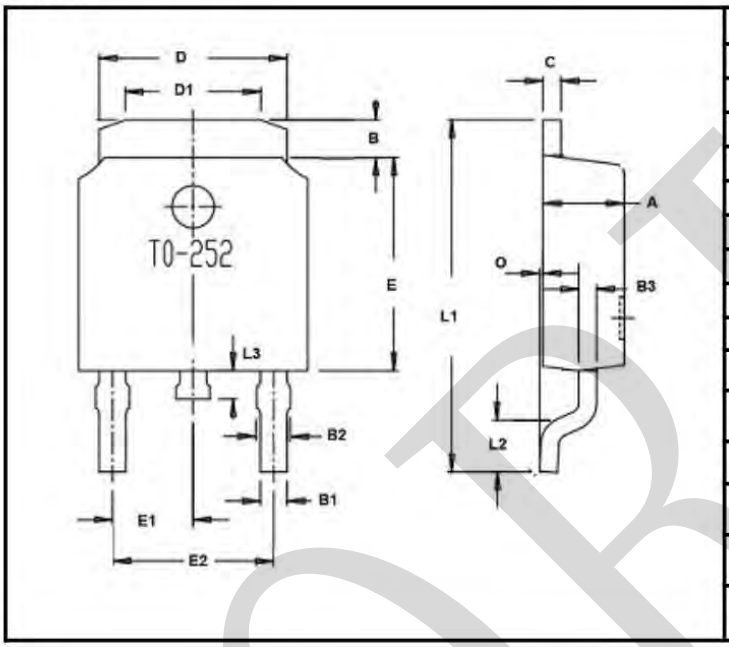
Figure.11: Maximum Effective Transient Thermal Impedance, Junction-to-Case (TO-252)



PACKAGE OUTLINE DIMENSIONS

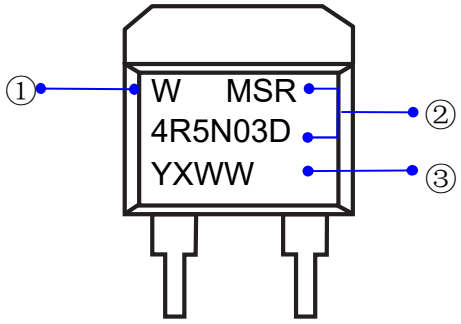
Note:unit mm

TO-252



Dim.	Min.	Max.
A	2.15	2.45
B	0.96	1.42
C	Typ0.5	
D	5.33	5.53
D1	3.65	4.05
E	6.0	6.2
E1	Typ2.29	
E2	Typ4.58	
B1	0.74	0.86
B2	0.74	0.94
O	0	0.15
L1	9.9	10.5
L2	Typ1.65	
L3	0.6	1.0
All Dimensions in millimeter		

Marking Information



①W : Company's trademark
②Product model : MSR4R5N03D
③PDC information：