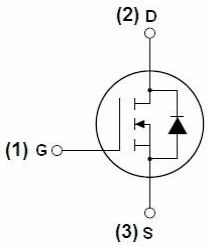
3N10

100V N-Channel Enhancement Mode MOSFET

Description

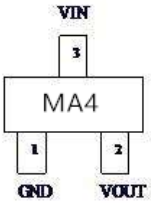
The 3N10 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other Switching application.



General Features

V_{DS} = 100V I_D = 2.8A

$R_{DS(ON)}$ < 310mΩ @ V_{GS}=10 V



Application

Battery protection

Load switch

Uninterruptible power supply

Package Marking and Ordering Information

Product ID	Pack	Marking	Qty(PCS)
3N10	SOT23	MA4	3000

Absolute Maximum Ratings T_C=25℃ unless otherwise noted

Symbol	Parameter	Rating	Units
V_{DS}	Drain-Source Voltage	100	V
V_{GS}	Gate-Source Voltage	±20	V
I_D	Drain Current – Continuous (T_C=25℃)	2.8	A
	Drain Current – Continuous (T_C=100℃)	1.5	A
I_{DM}	Drain Current – Pulsed[1]	6.8	A
P_D	Power Dissipation (T_C=25℃)	1.76	W
	Power Dissipation – Derate above 25℃	0.014	W/℃
T_{STG}	Storage Temperature Range	-50 to 150	℃
T_J	Operating Junction Temperature Range	-50 to 150	℃

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
$R_{\theta JA}$	Thermal Resistance Junction to ambient	---	70	℃/W
$R_{\theta JC}$	Thermal Resistance Junction to Case	---	30	℃/W

Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

Off Characteristics

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V , I_D=250uA	100	---	---	V
$\triangle BV_{DSS}/\triangle T_J$	BV_{DSS} Temperature Coefficient	Reference to 25℃ , I_D=1mA	---	0.09	---	V/℃
I_{DSS}	Drain-Source Leakage Current	V_{DS}=100V , V_{GS}=0V , T_J=25℃	---	---	1	uA
		V_{DS}=80V , V_{GS}=0V , T_J=125℃	---	---	10	uA
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V , V_{DS}=0V	---	---	±100	nA
$R_{DS(ON)}$	Static Drain-Source On-Resistance	V_{GS}=10V , I_D=1A	---	260	310	mΩ
		V_{GS}=4.5V , I_D=0.5A	---	270	320	mΩ
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}=V_{DS} , I_D =250uA	1.2	1.8	2.5	V
$\triangle V_{GS(th)}$	$V_{GS(th)}$ Temperature Coefficient		---	-5	---	mV/℃
gfs	Forward Transconductance	V_{DS}=10V , I_D=2A	---	2.3	---	S
Q_g	Total Gate Charge[2,3]	V_{DS}=50V , V_{GS}=10V , I_D=1A	---	9	18	nC
Q_{gs}	Gate-Source Charge[2,3]		---	2.3	4.6	
Q_{gd}	Gate-Drain Charge[2,3]		---	1.1	2.5	
$T_{d(on)}$	Turn-On Delay Time[2,3]	V_{DD}=50V , V_{GS}=10V , R_G=3.3 I_D=1A	---	5.2	10	ns
T_r	Rise Time[2,3]		---	6.8	12	
$T_{d(off)}$	Turn-Off Delay Time[2,3]		---	14.5	28	
T_f	Fall Time[2,3]		---	2.1	5	
C_{iss}	Input Capacitance	V_{DS}=25V , V_{GS}=0V , F=1MHz	---	492	800	pF
C_{oss}	Output Capacitance		---	27	50	
C_{rss}	Reverse Transfer Capacitance		---	15	25	
R_g	Gate resistance	V_{GS}=0V, V_{DS}=0V, F=1MHz	---	2.8	5.6	

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Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_S	Continuous Source Current		---	---	4	A
		V_G=V_D=0V , Force Current				
I_{SM}	Pulsed Source Current		---	---	8	A
V_{SD}	Diode Forward Voltage	V_{GS}=0V , I_S=1A , T_J=25℃	---	---	1	V
t_{rr}	Reverse Recovery Time[2]	I_S=1A , dI/dt=100A/μs	---	---	---	ns
Q_{rr}	Reverse Recovery Charge[2]	T_J=25℃	---	---	---	nC

Note :

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.

23. . Essentially independent of operating temperature. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%.

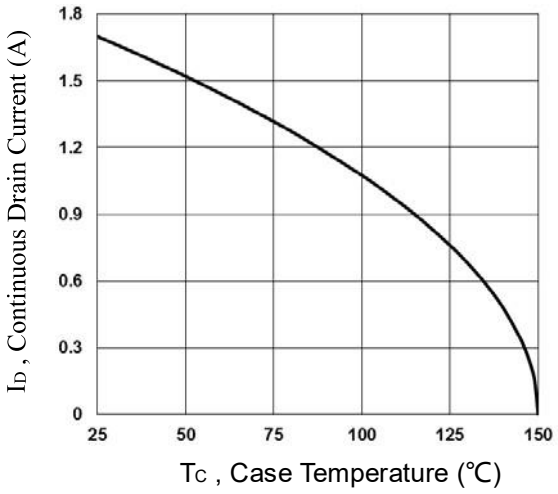


Fig.1 Continuous Drain Current vs. T_C

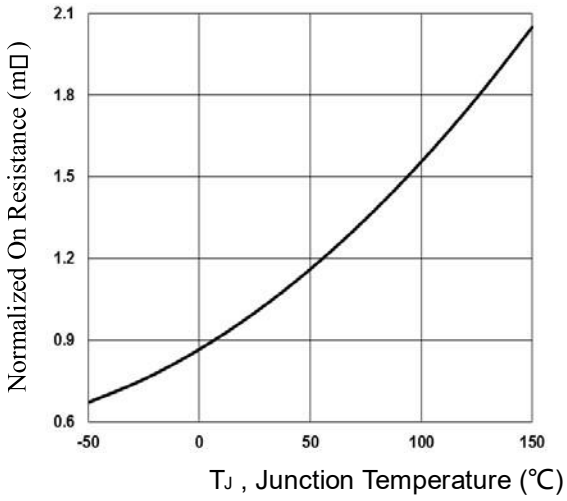
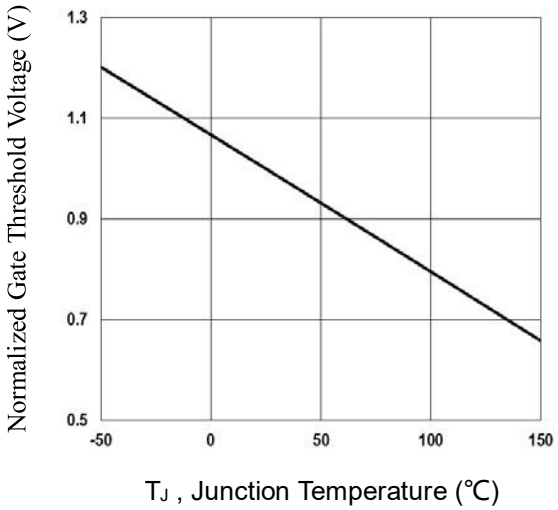


Fig.2 Normalized RDSON vs. T_J



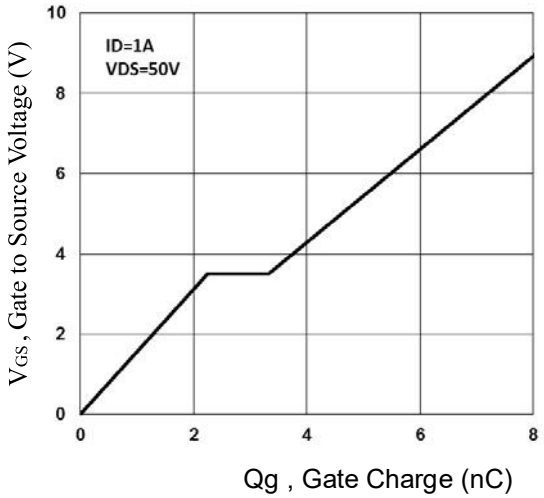


Fig.3 Normalized V_{th} vs. T_J

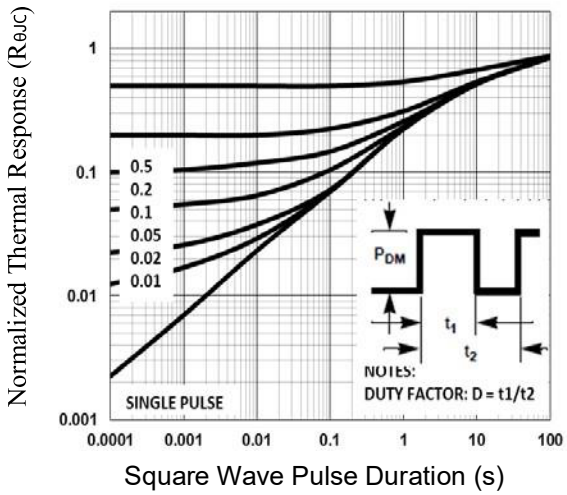


Fig.4 Gate Charge Waveform

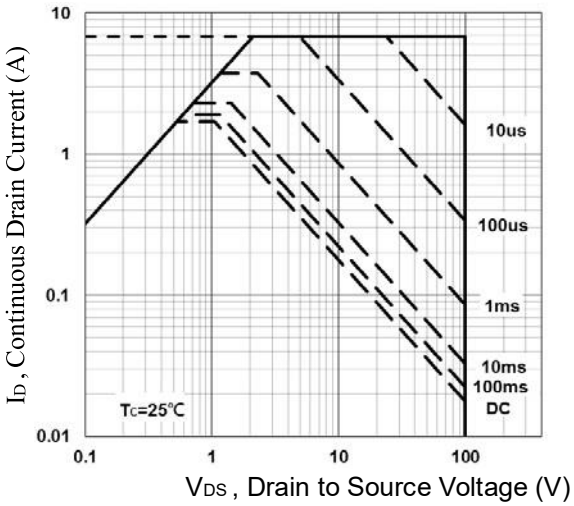
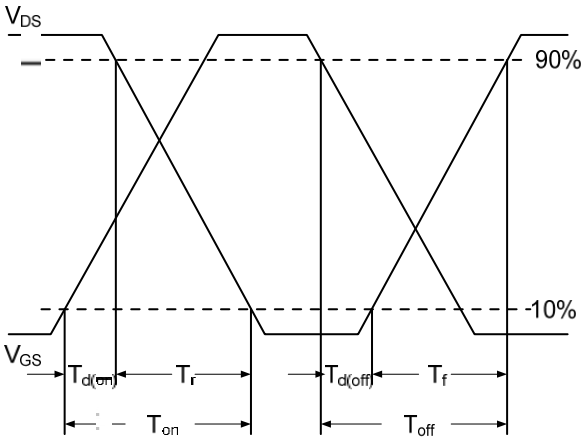


Fig.5 Normalized Transient Impedance

Fig.6 Maximum Safe Operation Area



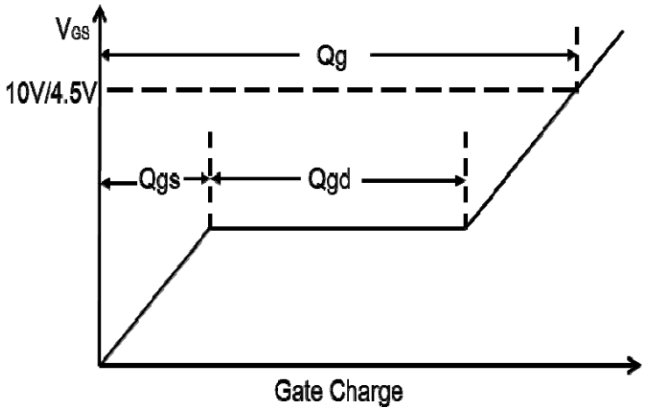
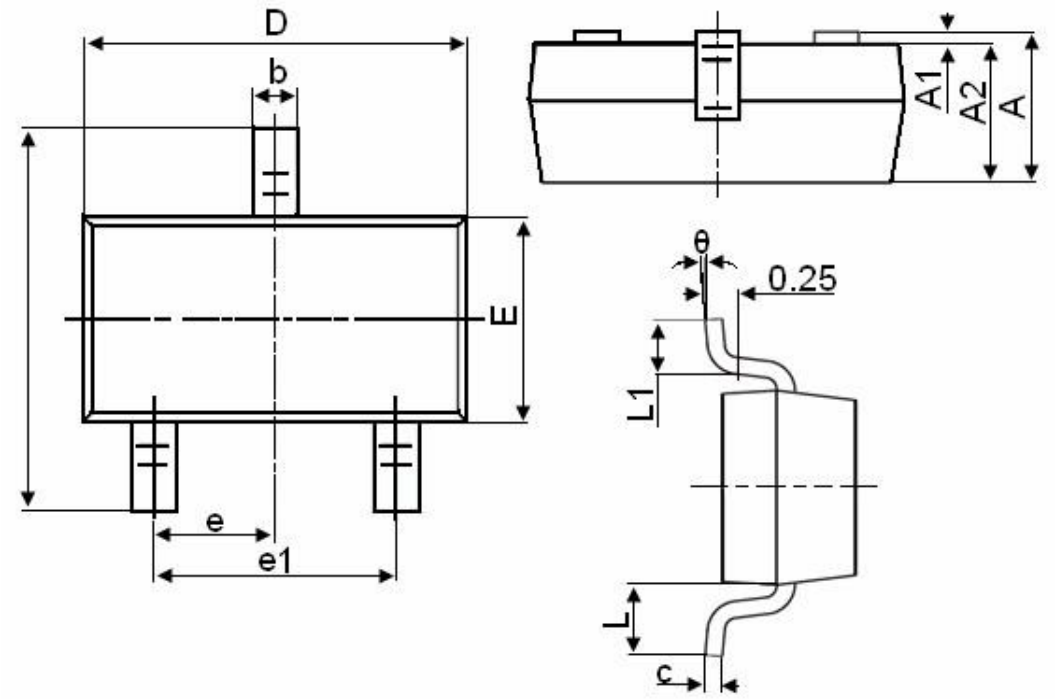


Fig.7 Switching Time Waveform

Fig.8 Gate Charge Waveform

SOT-23 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.520	1.800	0.060	0.071
A1	0.000	0.100	0.000	0.004
A2	1.500	1.700	0.059	0.067
b	0.660	0.820	0.026	0.032
c	0.250	0.350	0.010	0.014
D	6.200	6.400	0.244	0.252
D1	2.900	3.100	0.114	0.122
E	3.300	3.700	0.130	0.146
E1	6.830	7.070	0.269	0.278
e	2.300 (BSC)		0.091 (BSC)	
e1	4.500	4.700	0.177	0.185
L	0.900	1.150	0.035	0.045
θ	0°	10°	0°	10°