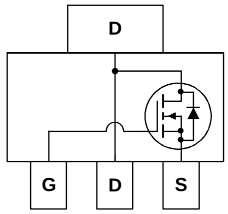
100V N-Channel MOSFET

General Description

This N-Channel MOSFET has been designed specifically to improve the overall efficiency of DC/ DC converters using either synchronous or conventional switching PWM controllers.

These MOSFETs feature faster switching and lower gate charge than other MOSFETs with comparable $R_{DS(ON)}$ specifications. The result is a MOSFET that is easy and safer to drive (even at very high frequencies), and DC/ DC power supply designs with higher overall efficiency.



Features

- $V_{DS\,(V)}$ = 100V
- I_D = 3.7A (V_{GS} = 10V)
- $R_{DS(ON)}$ < 120mΩ (V_{GS}=10V)
- $R_{DS(ON)}$ < 130mΩ (V_{GS}=6V)
- Fast switching speed
- Low gate charge (14nC typ)
- High performance trench technology for extremely low $R_{DS(ON)}$
- High power and current handling capability in a widely used surface mount package

Applications

- DC/DC converter
- Motor driving

Absolute Maximum Ratings

T_A=25°C unless otherwise noted

Symbol	Parameter		Ratings	Units
V_{DSS}	Drain-Source Voltage		100	V
V_{GSS}	Gate-Source Voltage		±20	V
I_D	Drain Current – Continuous	(Note 1a)	3.7	A
	– Pulsed		20	
P_D	Maximum Power Dissipation	(Note 1a)	3.0	W
		(Note 1b)	1.3	
		(Note 1c)	1.1	
T_J, T_{STG}	Operating and Storage Junction Temperature Range		–55 to +150	°C

Thermal Characteristics

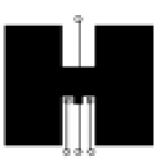
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	(Note 1a)	42	°C/W
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	(Note 1)	12	°C/W

Electrical Characteristics T_A = 25°C unless otherwise noted

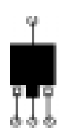
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
W_{DSS}	Drain-Source Avalanche Energy	Single Pulse, V_{DD} = 50 V, I_D= 3.7 A			90	mJ
I_{AR}	Drain-Source Avalanche Current				3.7	A
BV_{DSS}	Drain–Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250 μA	100			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		106		mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 80 V, V_{GS} = 0 V			10	μA
I_{GSSF}	Gate–Body Leakage, Forward	V_{GS} = 20 V, V_{DS} = 0 V			100	nA
I_{GSSR}	Gate–Body Leakage, Reverse	V_{GS} = –20 V, V_{DS} = 0 V			–100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	1	1.6	3	V
$\frac{\Delta V_{GS(th)}}{\Delta T_J}$	Gate Threshold Voltage Temperature Coefficient	I_D = 250 μA, Referenced to 25°C		–6		mV/°C
$R_{DS(on)}$	Static Drain–Source On–Resistance	V_{GS} = 10 V, I_D = 3.7 A V_{GS} = 6 V, I_D = 3.5 A		88 94	120 130	mΩ
$I_{D(on)}$	On–State Drain Current	V_{GS} = 10 V, V_{DS} = 10 V	10			A
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 3.7 A		11		S
C_{iss}	Input Capacitance	V_{DS} = 50 V, V_{GS} = 0 V, f = 1.0 MHz		632		pF
C_{oss}	Output Capacitance			40		pF
C_{rss}	Reverse Transfer Capacitance			20		pF
$t_{d(on)}$	Turn–On Delay Time	V_{DD} = 50 V, I_D = 1 A, V_{GS} = 10 V, R_{GEN} = 6 Ω		8.5	17	ns
t_r	Turn–On Rise Time			2	4	ns
$t_{d(off)}$	Turn–Off Delay Time			23	37	ns
t_f	Turn–Off Fall Time			4.5	9	ns
Q_g	Total Gate Charge	V_{DS} = 50 V, I_D = 3.7 A, V_{GS} = 10 V		14	20	nC
Q_{gs}	Gate–Source Charge			2.4		nC
Q_{gd}	Gate–Drain Charge			3.8		nC
I_S	Maximum Continuous Drain–Source Diode Forward Current				2.5	A
V_{SD}	Drain–Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 2.5 A (Note 2)		0.75	1.2	V

Notes:

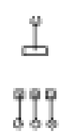
1. $R_{\theta JA}$ is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design.



a) 42°C/W when mounted on a 1in² pad of 2 oz copper



b) 95°C/W when mounted on a .0066 in² pad of 2 oz copper



c) 110°C/W when mounted on a minimum pad.

Typical Characteristics

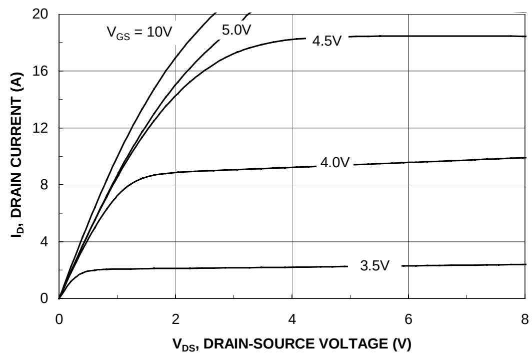


Figure 1. On-Region Characteristics.

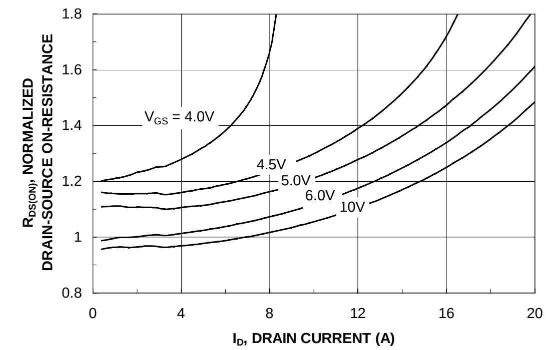


Figure 2. On-Resistance Variation with Drain Current and Gate Voltage.

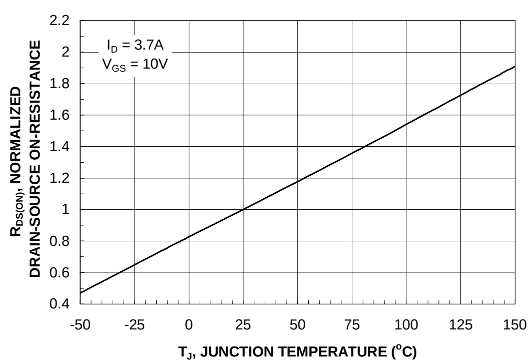


Figure 3. On-Resistance Variation with Temperature.

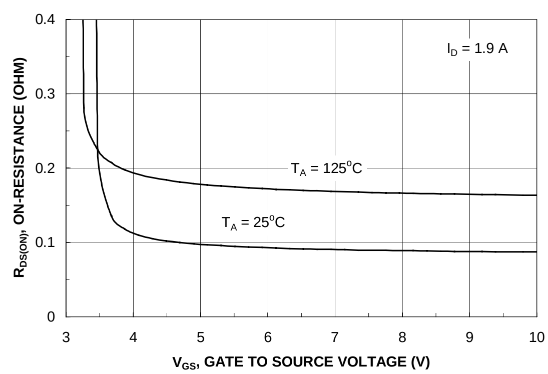


Figure 4. On-Resistance Variation with Gate-to-Source Voltage.

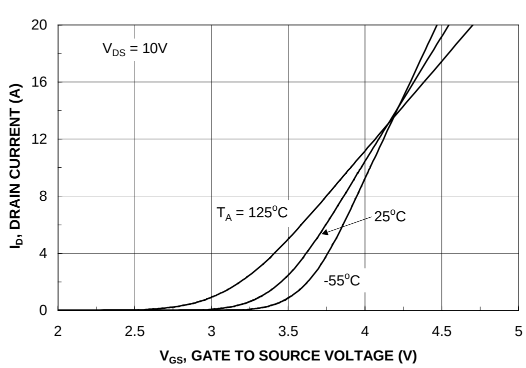


Figure 5. Transfer Characteristics.

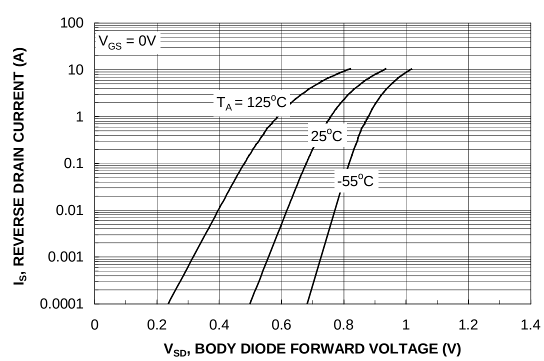


Figure 6. Body Diode Forward Voltage Variation with Source Current and Temperature.

Typical Characteristics

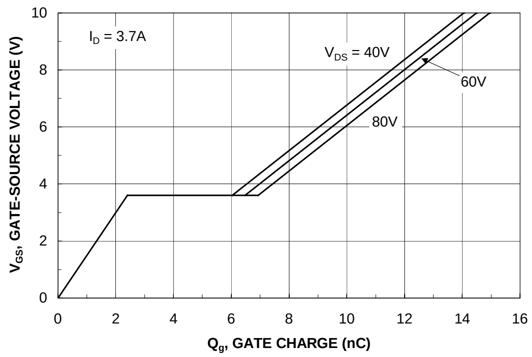


Figure 7. Gate Charge Characteristics.

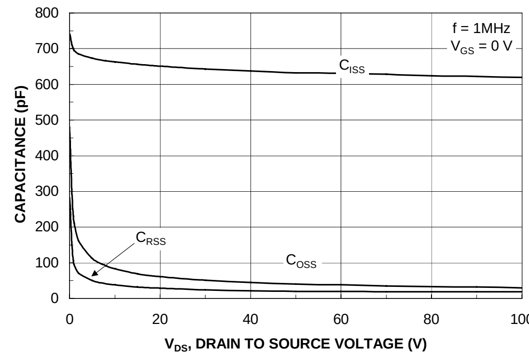


Figure 8. Capacitance Characteristics.

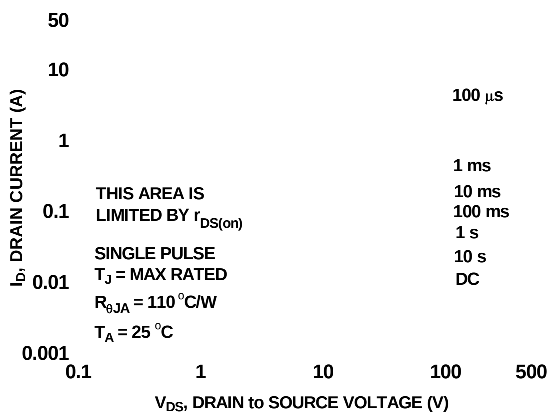


Figure 9. Maximum Safe Operating Area.

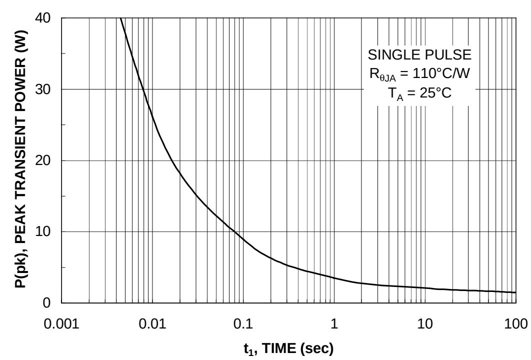


Figure 10. Single Pulse Maximum Power Dissipation.

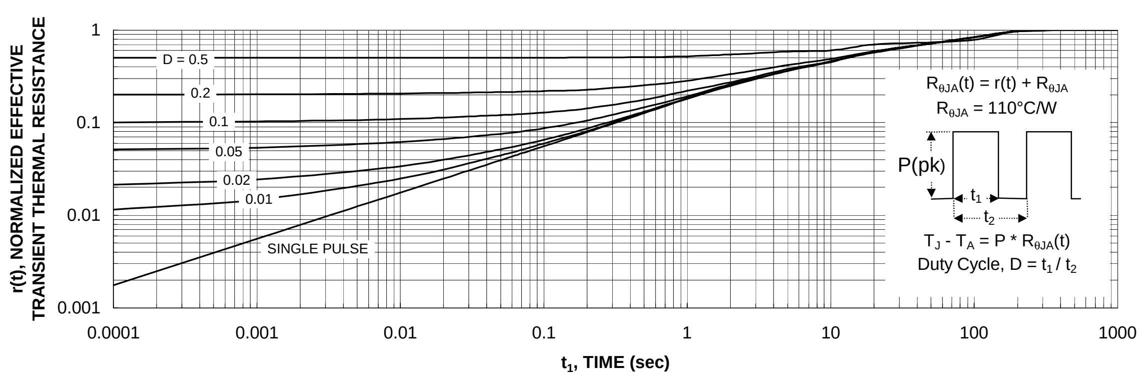
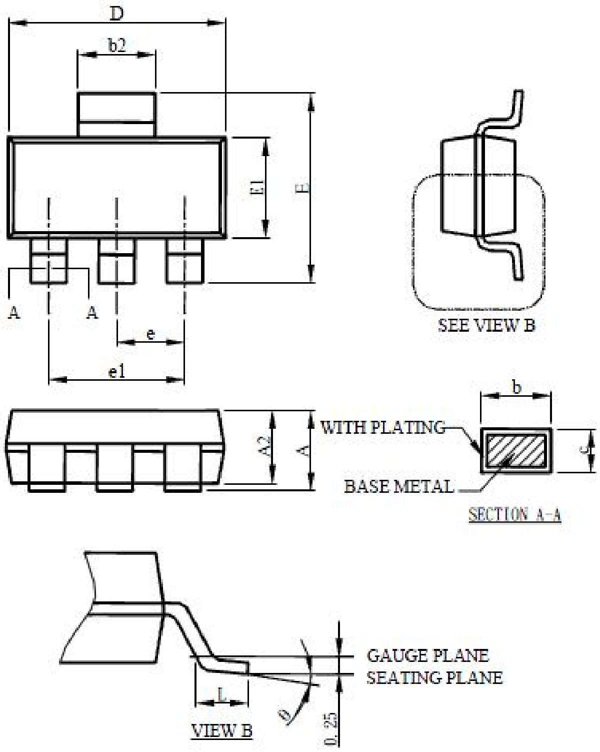


Figure 11. Transient Thermal Response Curve.

Thermal characterization performed using the conditions described in Note 1c.
Transient thermal response will change depending on the circuit board design.

■ SOT223 封裝外形圖



SYMBOL	SOT-223	
	MILLIMETERS	
	MIN.	MAX.
A		1.80
A1	0.02	0.10
A2	1.55	1.65
b	0.66	0.84
b2	2.90	3.10
c	0.23	0.33
D	6.30	6.70
E	6.70	7.30
E1	3.30	3.70
e	2.30 BSC	
e1	4.60 BSC	
L	0.90	
θ	0°	8°

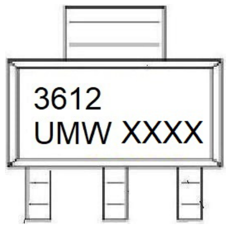
Note:

1.Refer to JEDEC TO-261AA.

2.Dimension D and E1 are determined at the outermost extremes of the plastic body exclusive of mold flash, tie bar burrs, gate burrs, and interlead flash, but including any mismatch between the top and bottom of the plastic body.

3.Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

Marking



Ordering information

Order code	Package	Baseqty	Deliverymode
UMW FDT3612	SOT-223	2500	Tape and reel