N-Ch 600V Fast Switching MOSFETs

General Description

The UI02N60 is the highest performance trench P-ch MOSFETs with extreme high cell density , which provide excellent RDSON and gate charge for most of the synchronous buck converter applications .

The UI02N60 meet the RoHS and Green Product requirement , 100% EAS guaranteed with full function reliability approved.

Features

- Advanced high cell density Trench technology
- Super Low Gate Charge
- Excellent CdV/dt effect decline
- 100% EAS Guaranteed
- Green Device Available

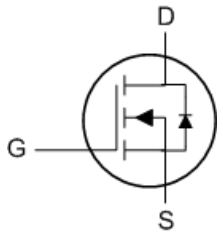
Product Summery

BV_{DSS}	$RD_{S(ON)}$	ID
600V	3.9 Ω	2A

Applications

- High Frequency Point-of-Load Synchronous Buck Converter for MB/NB/UMPC/VGA
- Networking DC-DC Power System
- Load Switch

TO-251 Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	TO-251		Unites
V_{DSS}	Drain-Source Voltage	600		V
I_D	Drain Current –Continuous(T_C = 25℃)	2		A
	Drain Current –Continuous(T_C = 100℃)	1.35		A
I_{DM}	Drain Current –Pulsed (Note1)	8		A
V_{GSS}	Gate-Source Voltage	±30		V
E_{AS}	Single Pulsed Avalanche Energy (Note2)	55		mJ
dv/dt	Peak Diode Recovery dv/dt (Note3)	4.5		V/ns
P_D	Power Dissipation (T_C = 25℃)	56	29	W
	-Derate above 25℃	0.44	0.23	W/℃
T_{J1} T_{STG}	Operating and Storage Temperature Range	-55 to + 150		℃
T_L	Maximum lead temperature for soldering purposes, 1/8" from case for 5 seconds	300		℃

Thermal Data

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	--	2.25	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	62.5	℃/W

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

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250μA	600	645	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250μ A, Referenced to 25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS} = 600 V, V_{GS} = 0 V (T_c = 25℃)	--	--	10	μA
		V_{DS} = 480 V, V_{GS} = 0 V (T_c = 125℃)	--	--	100	μA
I_{GSSF}	Gate-Body Leakage Current, Forward	V_{GS} = 30 V, V_{DS} = 0 V	--	--	100	nA
I_{GSSR}	Gate-Body Leakage Current, Reverse	V_{GS} = -30 V, V_{DS} = 0 V	--	--	-100	nA
On Characteristics						
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS} = V_{GS}, I_D = 250 μA	2.5	3.6	4.5	V
$R_{DS(on)}$	Static Drain-Source On-resistance	V_{GS} = 10 V, I_D = 1 A	--	3.9	4.4	Ω
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 1 A (Note 4)	--	1.5	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHZ	--	249	323	pF
C_{oss}	Output Capacitance		--	30.7	40	pF
C_{rss}	Reverse Transfer Capacitance		--	5.0	6.5	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 2 A, R_G = 25 Ω (Note 4, 5)	--	9.1	22	ns
t_r	Turn-On Rise Time		--	9.8	24	ns
$t_{d(off)}$	Turn-Off Delay Time		--	17.4	42	ns
t_f	Turn-Off Fall Time		--	12.4	30	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 2 A, V_{GS} = 10 V (Note 4, 5)	--	9.4	13.1	nC
Q_{gs}	Gate-Source Charge		--	2.2	--	nC
Q_{gd}	Gate-Drain Charge		--	4.7	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	2	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	8	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 2A	--	0.9	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS}= 0 V,I_S = 2A, dI_F/dt = 100 A/μ s (Note 4)	--	490	--	ns
Q_{rr}	Reverse Recovery Charge		--	0.8	--	μ C

Notes:

1. Repetitive Rating：Pulse width limited by maximum junction temperature
2. L = 25mH, I_{AS} = 2A, V_{DD} = 50V, R_G =25Ω, Starting T_J = 25℃
3. I_{SD} ≤ 2A, di/dt ≤ 200A/μS, V_{DD} ≤ BV_{DSS}, Starting T_J = 25℃
4. Pulse Test：Pulse width ≤ 300μS, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

Figure 1. On-Region Characteristics

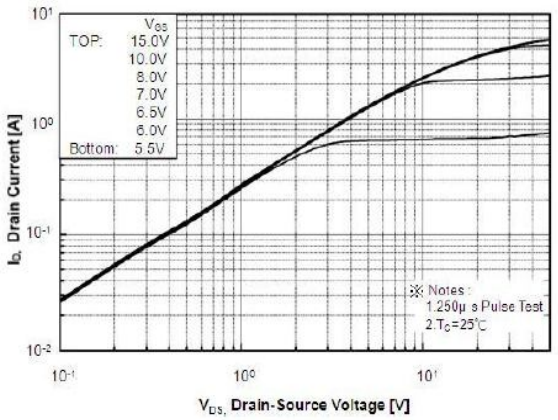


Figure 2. Transfer Characteristics

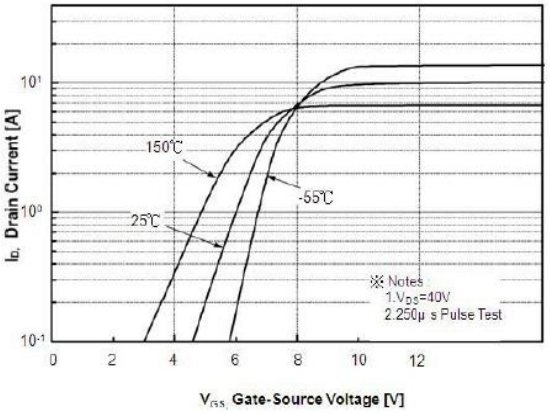


Figure 3. On-Resistance Variation VS. Drain Current and Gate Voltage.

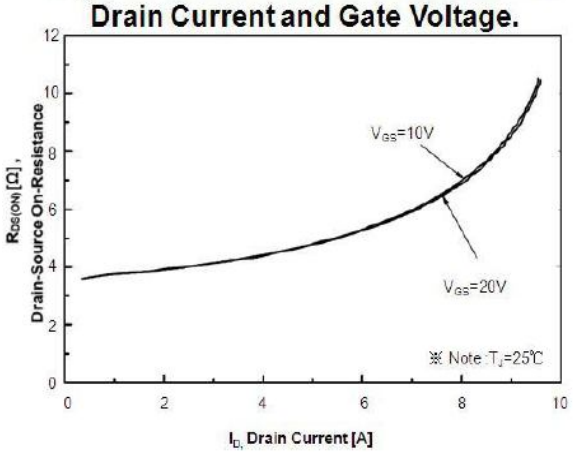
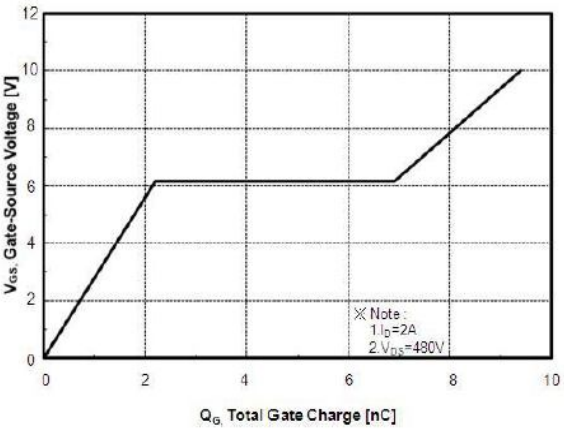
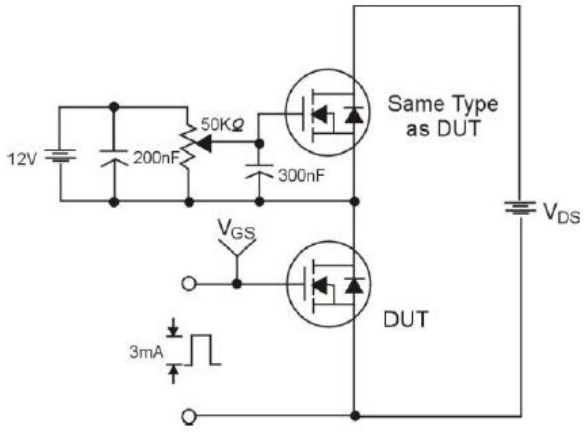
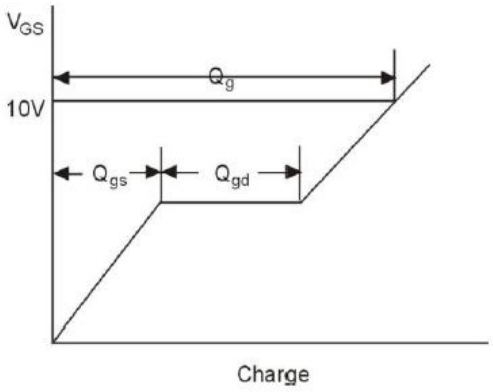


Figure 4. Gate Charge Characteristics

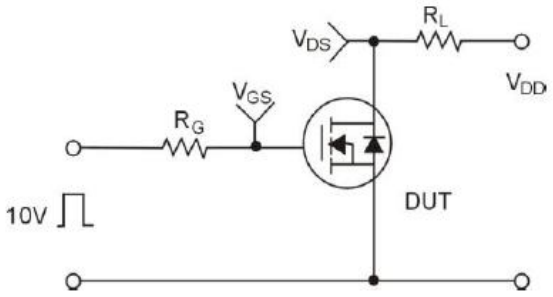


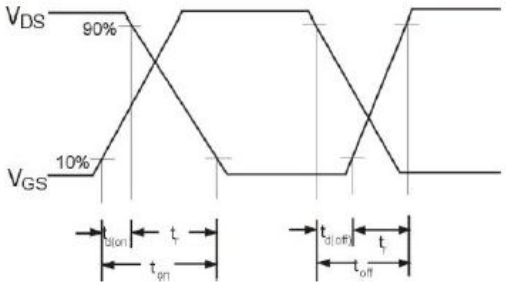
Gate Charge Test Circuit Waveform



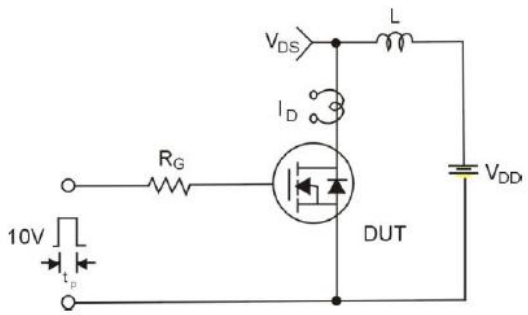


Resistive Switching Test Circuit Waveforms

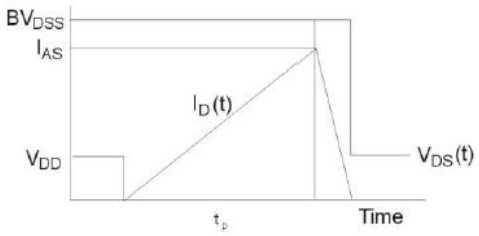




Unclamped Inductive Switching Test Circuit Waveforms



$$E_{AS} = \frac{1}{2} L I_{AS}^2 \frac{BV_{DSS}}{BV_{DSS} - V_{DD}}$$



Gate Charge Test Circuit Waveform