Unitpower

UT4N60F

N-Ch 600V Fast Switching MOSFETs

General Description

The UT4N60F 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 UT4N60F 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

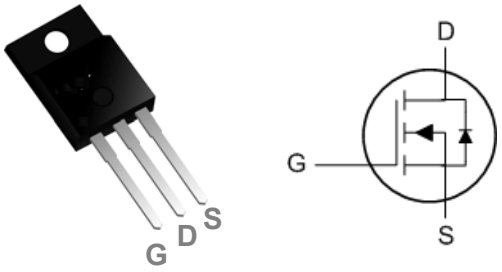
Product Summery

BVDSS	RDS(ON)	ID
600V	2.2Ω	4A

Applications

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

TO220F Pin Configuration



Absolute Maximum Ratings

Symbol	Parameter	TO220F	Unites
VDSS	Drain-source Voltage	600	V
ID	Drain current -Continuous (Tc=25℃)	4	A
	-Continuous (Tc=100℃)	2.8	A
IDM	Drain current - pulsed (Note1)	16	A
VGSS	Gate-Source Voltage	±30	V
EAS	Single Pulsed Avalanche Energy (Note2)	8.8	mJ
Dv/Dt	Peak Diode Recovery Dv/Dt (Note3)	4.5	V/ns
PD	Power Dissipation (Tc=25℃)	33	W
	- Derate above 25℃	0.26	W/℃
TJ TSTG	Operating and Storage Temperature Range	-55-150	℃
TL	Maximum Lead temperature for soldering purposes, 1/8" from case for seconds	300	℃

Thermal Data

Symbol	Parameter	Type	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-case	--	3.8	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	--	6.5	℃/W

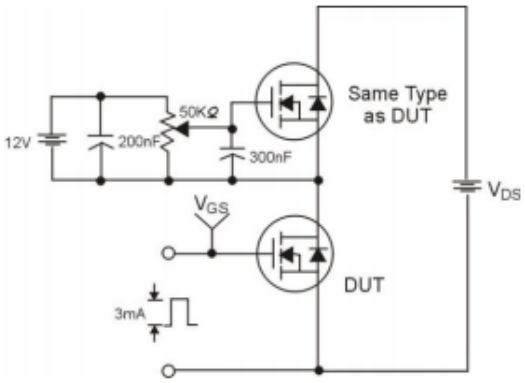
Electrical Characteristics (T_J=25 ℃, unless otherwise noted)

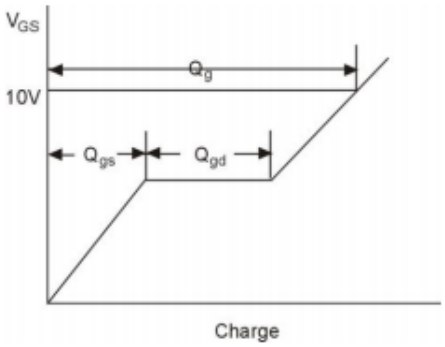
Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 250μA	600	644	--	V
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temperature Coefficient	I_D = 250μ A, Referenced to 25℃	--	0.6	--	V/℃
I_{DSS}	Zero Gate Voltage Drain 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	3.5	4.5	V
$R_{DS(on)}$	Static Drain-Source On-resistance	V_{GS} = 10 V, I_D = 2 A	--	2.2	2.5	Ω
g_{FS}	Forward Transconductance	V_{DS} = 10 V, I_D = 2 A (Note 4)	--	3.0	--	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	V_{DS} = 25 V, V_{GS} = 0 V, f = 1.0 MHZ	--	484	629	pF
C_{oss}	Output Capacitance		--	51.7	67	pF
C_{rss}	Reverse Transfer Capacitance		--	8.7	11	pF
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	V_{DD} = 300 V, I_D = 4 A, R_G = 25 Ω (Note 4, 5)	--	11	27	ns
t_r	Turn-On Rise Time		--	20	48	ns
$t_{d(off)}$	Turn-Off Delay Time		--	30	72	ns
t_f	Turn-Off Fall Time		--	19	46	ns
Q_g	Total Gate Charge	V_{DS} = 480 V, I_D = 4 A, V_{GS} = 10 V (Note 4, 5)	--	14.5	20	nC
Q_{gs}	Gate-Source Charge		--	3.4	--	nC
Q_{gd}	Gate-Drain Charge		--	7.0	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I_S	Maximum Continuous Drain-Source Diode Forward Current		--	--	4	A
I_{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	16	A
V_{SD}	Drain-Source Diode Forward Voltage	V_{GS} = 0 V, I_S = 4 A	--	0.97	1.4	V
t_{rr}	Reverse Recovery Time	V_{GS}= 0 V, I_S = 4 A, dI_F/dt = 100 A/μ s (Note 4)	--	557	--	ns
Q_{rr}	Reverse Recovery Charge		--	1.6	--	μ C

Notes:

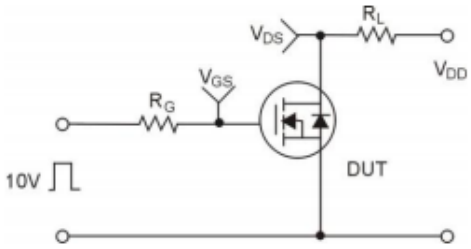
1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 1mH, I_{AS} = 4A, V_{DD} = 50V, R_G =25Ω, Starting T_J = 25℃
3. I_{SD} ≤ 4A, di/dt ≤ 200A/μS, V_{DD} ≤ BV_{DSS}, Starting T_J = 25℃
4. Pulse Test : Pulse width ≤ 300μS, Duty cycle ≤ 2%
5. Essentially independent of operating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

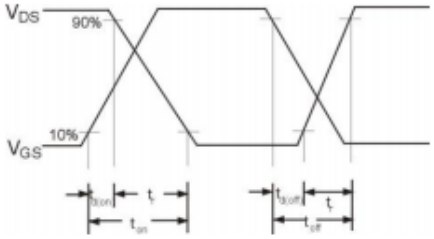
Gate Charge Test Circuit Waveform



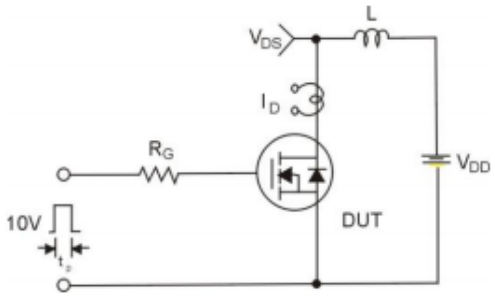


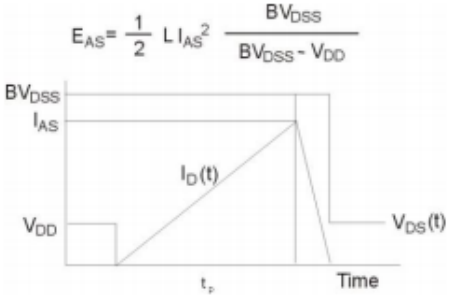
Resistive Switching Test Circuit Waveforms



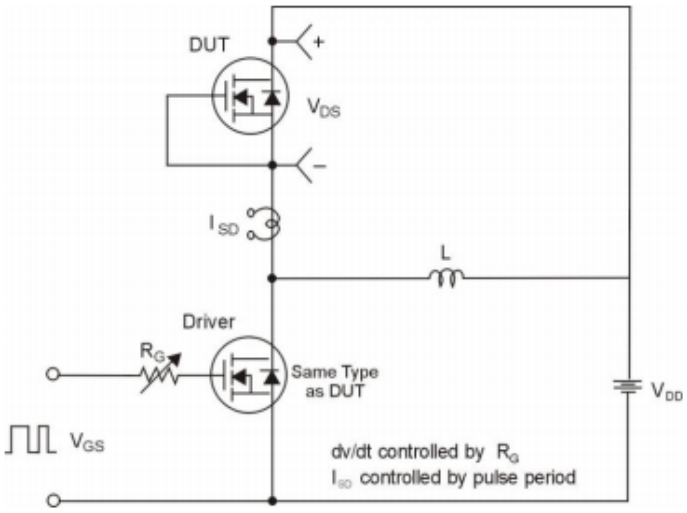


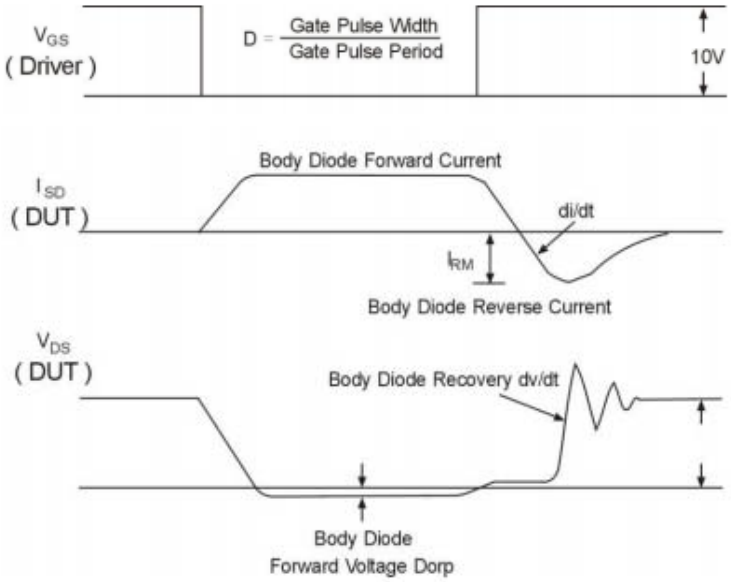
Unclamped Inductive Switching Test Circuit Waveforms





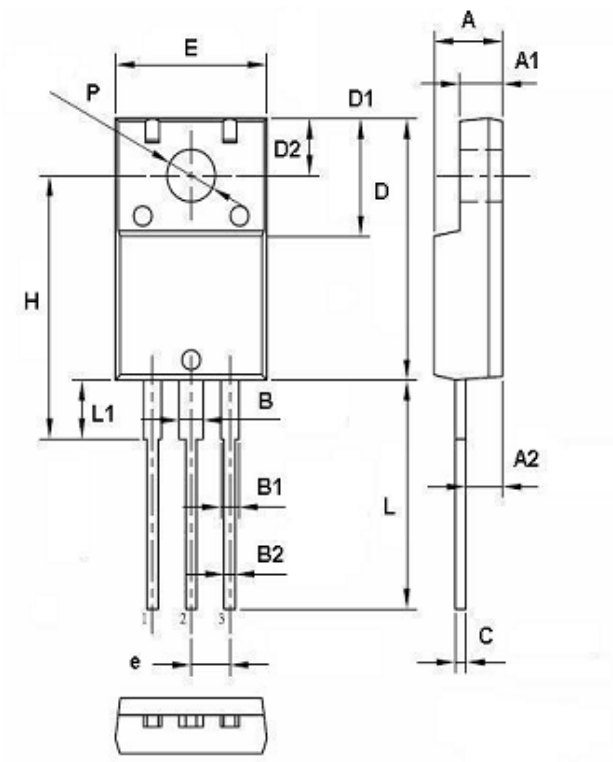
Gate Charge Test Circuit & Waveform





Gate Charge Test Circuit Waveform

TO-220F Mechanical Drawing



TO-220F DIMENSION				
Symbol	Millimeters		Inches	
	Min.	Max.	Min.	Max.
A	4.200	4.800	0.165	0.189
A1	2.500	3.100	0.098	0.122
A2	2.100	2.700	0.083	0.106
B	1.300	1.900	0.051	0.075
B1	0.900	1.500	0.035	0.059
B2	0.650	1.050	0.026	0.041
C	0.400	1.000	0.016	0.039
D	15.700	16.300	0.618	0.642
D1	6.900	7.500	0.272	0.295
D2	3.200	3.800	0.126	0.150
E	9.700	10.300	0.382	0.406
e	2.350	2.750	0.093	0.108
H	15.800	16.400	0.622	0.646
L	13.500	14.500	0.531	0.571
L1	3.400	3.800	0.134	0.150