600V N-Channel MOSFET

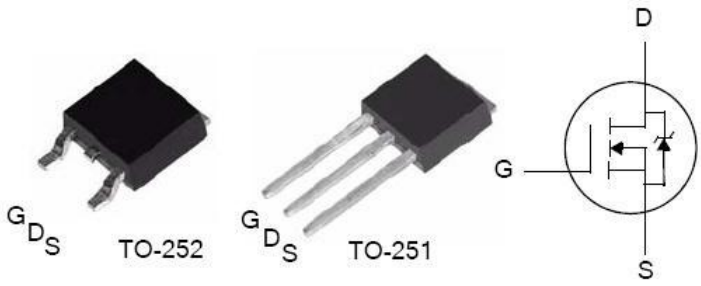
BV_{DSS}	$R_{DS(ON)}$ (Max.)	I_D
600V	9.0Ω	1.0A

General Features

- Low ON Resistance
- Low Gate Charge (typical 4.8nC)
- Fast Switching
- 100% Avalanche Tested
- RoHS Compliant
- Halogen-free available

Applications

- High Efficiency SMPS
- CFL
- Active PFC
- Low Power Lamp Ballasts
- Low Power Adaptor/Battery Chargers



Ordering Information

Part Number	Package	Marking	Remark
FTU01N60	TO-251（I-PAK）	01N60	RoHS
FTU01N60G	TO-251（I-PAK）	01N60G	Halogen-free
FTD01N60	TO-252（D-PAK）	01N60	RoHS
FTD01N60G	TO-252（D-PAK）	01N60G	Halogen-free

Absolute Maximum Ratings

T_C=25℃ unless otherwise specified

Symbol	Parameter	FTU01N60	FTD01N60	Unit
V_{DSS}	Drain-to-Source Voltage[1]	600		V
I_D	Continuous Drain Current	1.0		A
I_D@100℃	Continuous Drain Current	Figure 3		
I_{DM}	Pulsed Drain Current, V_{GS}@10V[2]	Figure 6		
P_D	Power Dissipation	29		W
	Derating Factor above 25℃	0.23		W/℃
V_{GS}	Gate-to-Source Voltage	±30		V
E_{AS}	Single Pulse Avalanche Energy L=40mH, I_D=1.0A	20		mJ
dv/dt	Peak Diode Recovery dv/dt[3]	4.5		V/ns
T_L	Soldering Temperature Distance of 1.6mm from case for 10 seconds	300		℃
T_J and T_{STG}	Operating and Storage Temperature Range	-55 to 150		

Caution: Stresses greater than those listed in the "Absolute Maximum Ratings" may cause permanent damage to the device.

Thermal Characteristics

Symbol	Parameter	FTU01N60	FTD01N60	Unit
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	4.3		℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	100		

Electrical Characteristics

OFF Characteristics

T_C =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	600	--	--	V	V_{GS}=0V, I_D=250μA
$\triangle BV_{DSS}/\triangle T_J$	Breakdown Voltage Temperature Coefficient	--	0.6	--	V/℃	Reference to 25℃, I_D=250μA
I_{DSS}	Drain-to-Source Leakage Current	--	--	20	μA	V_{DS}=600V, V_{GS}=0V
		--	--	100		V_{DS}=480V, V_{GS}=0V, T_C=125℃
I_{GSS}	Gate-to-Source Leakage Current	--	--	100	nA	V_{GS}=+30V
		--	--	-100		V_{GS}=-30V

ON Characteristics

T_C =25℃ unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$R_{DS(ON)}$	Static Drain-to-Source On-Resistance	--	7.2	9.0	Ω	V_{GS}=10V, I_D=0.5A[4]
$V_{GS(TH)}$	Gate Threshold Voltage	2.0	--	4.0	V	V_{DS} = V_{GS}, I_D=250μA
gfs	Forward Transconductance	--	0.9	--	S	V_{DS} =15V, I_D=1.0A[4]

Dynamic Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
C_{ISS}	Input Capacitance	--	163	--	pF	V_{GS}=0V V_{DS}=25V f=1.0MHz Figure 14
C_{OSS}	Output Capacitance	--	12.8	--		
C_{RSS}	Reverse Transfer Capacitance	--	2.5	--		
Q_G	Total Gate Charge	--	4.8	--	nC	V_{DD}=300V I_D=1.0A Figure 15
Q_{GS}	Gate-to-Source Charge	--	0.7	--		
Q_{GD}	Gate-to-Drain (Miller) Charge	--	2.2	--		

Resistive Switching Characteristics

Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Unit	Test Conditions
$t_{d(ON)}$	Turn-on Delay Time	--	6	--	ns	V_{DD}=300V I_D=1.0A V_{GS}=10V R_G=20Ω
t_{rise}	Rise Time	--	13	--		
$t_{d(OFF)}$	Turn-off Delay Time	--	13	--		
t_{fall}	Fall Time	--	27	--		

Source-Drain Diode Characteristics

T_C=25℃ unless otherwise specified

Symbol	Parameter	Min	Typ.	Max.	Units	Test Conditions
I_{SD}	Continuous Source Current (Body Diode)	--	--	1.0	A	Integral P-N diode in MOSFET
I_{SM}	Maximum Pulsed Current(Body Diode)	--	--	4.0	A	
V_{SD}	Diode Forward Voltage	--	--	1.2	V	I_S=1.0A, V_{GS}=0V
t_{rr}	Reverse Recovery Time	--	127	--	ns	V_{GS}=0V I_F=1.0A,di/dt=100A/μs
Q_{rr}	Reverse Recovery Charge	--	310	--	nC	

NOTE:

[1] T_J=+25℃ to +150℃
[2] Repetitive rating, pulse width limited by maximum junction temperature.
[3] I_{SD}=1.0A, di/dt≤100A/μs, V_{DD}≤BV_{DSS}, T_J=+150℃
[4] Pulse width≤380μs; duty cycle≤2%.

Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case

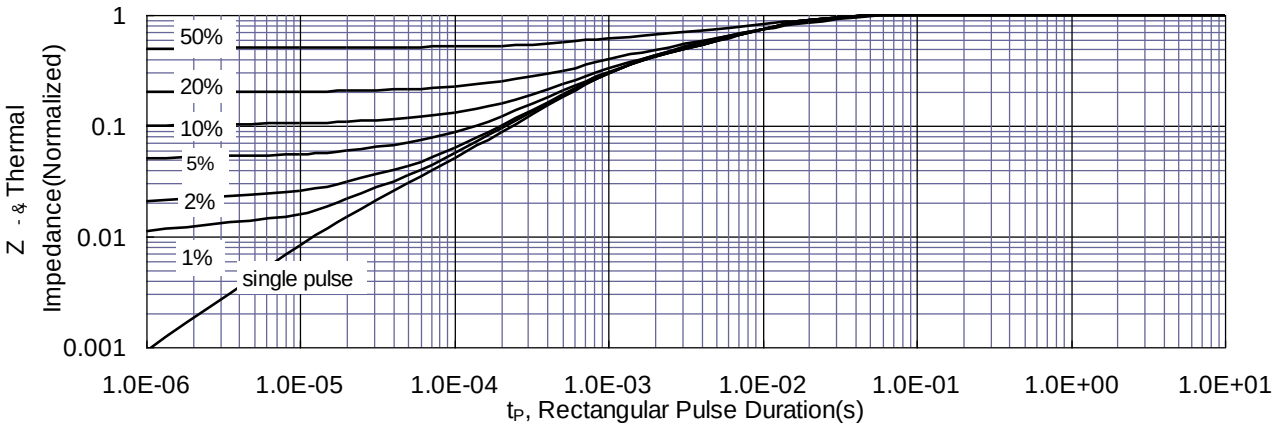


Figure 6. Maximum Peak Current Capability

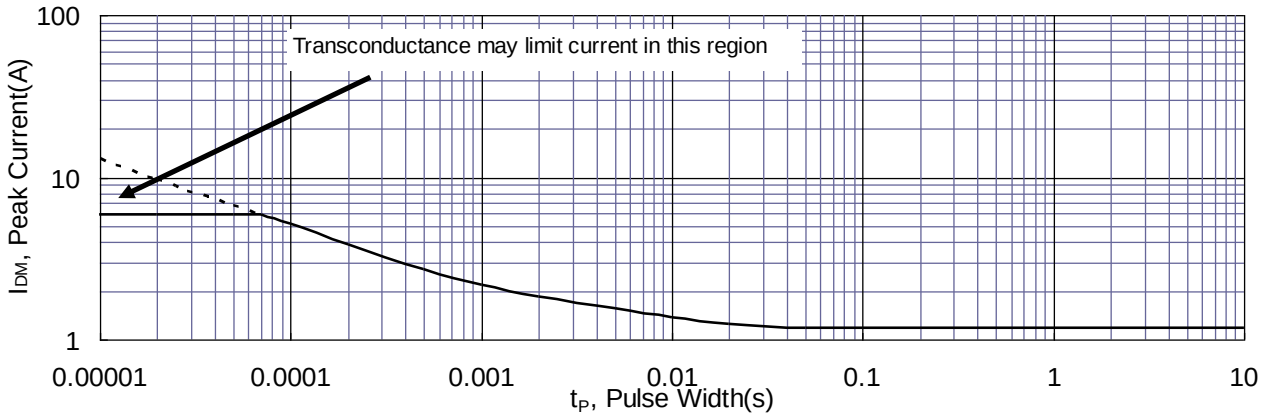


Figure 7. Typical Transfer Characteristics

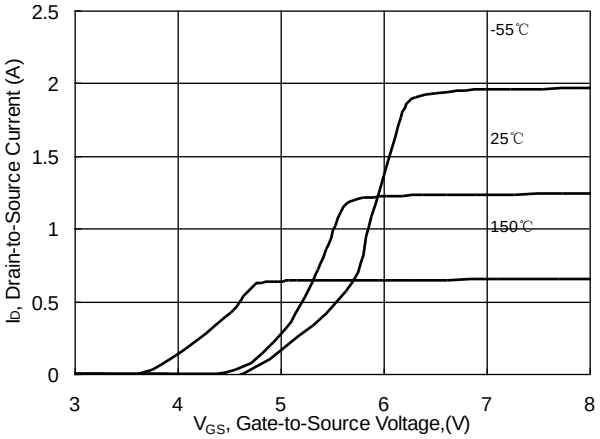


Figure 8. Unclamped Inductive Switching Capability

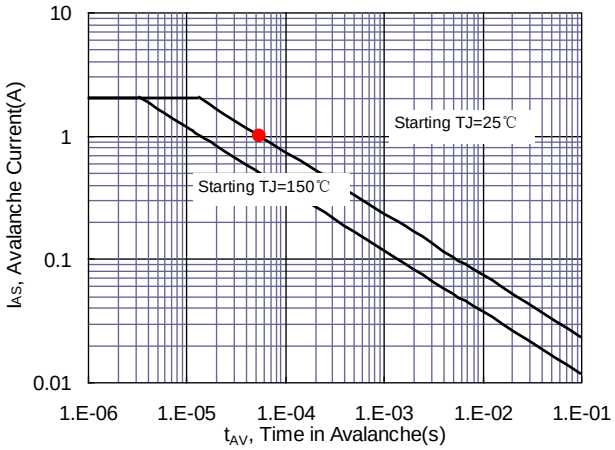


Figure 9. Typical Drain-to-Source ON Resistance

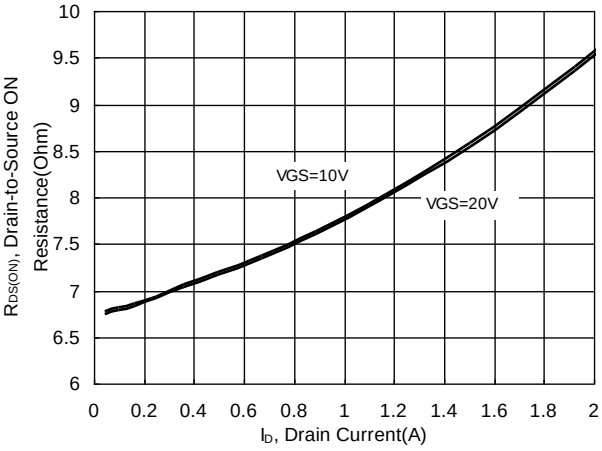
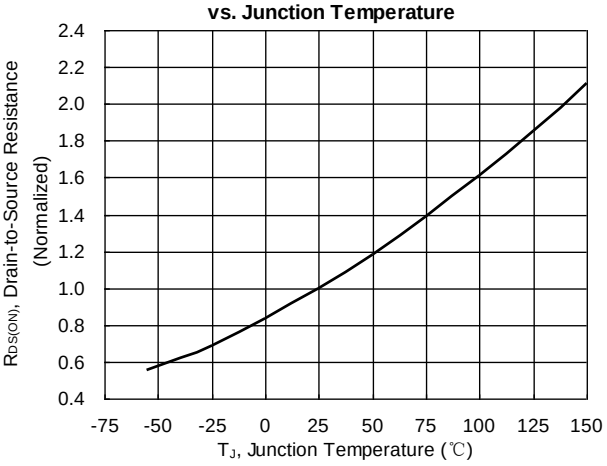


Figure 10. Typical Drain-to-Source On Resistance vs. Junction Temperature



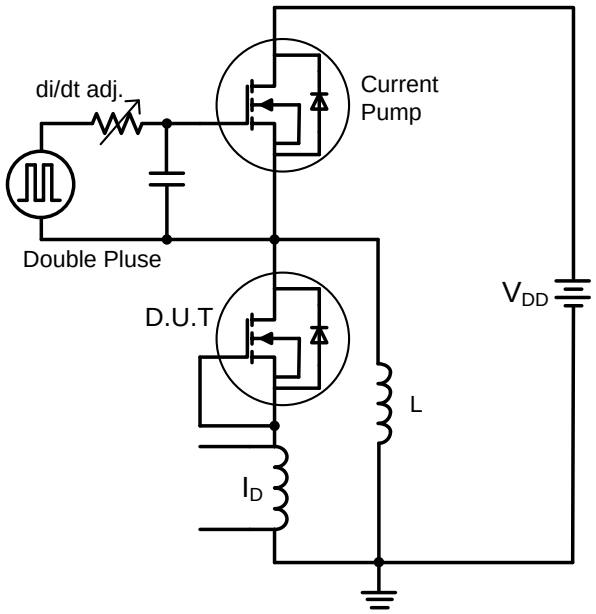


Figure 21. Diode Reverse Recovery Test Circuit

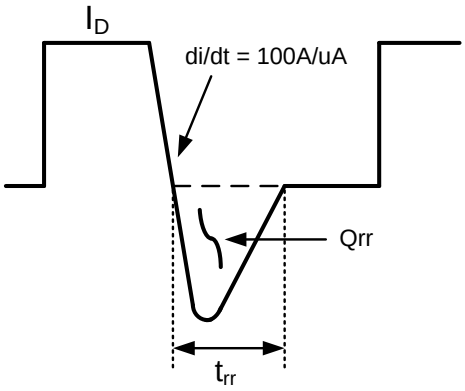
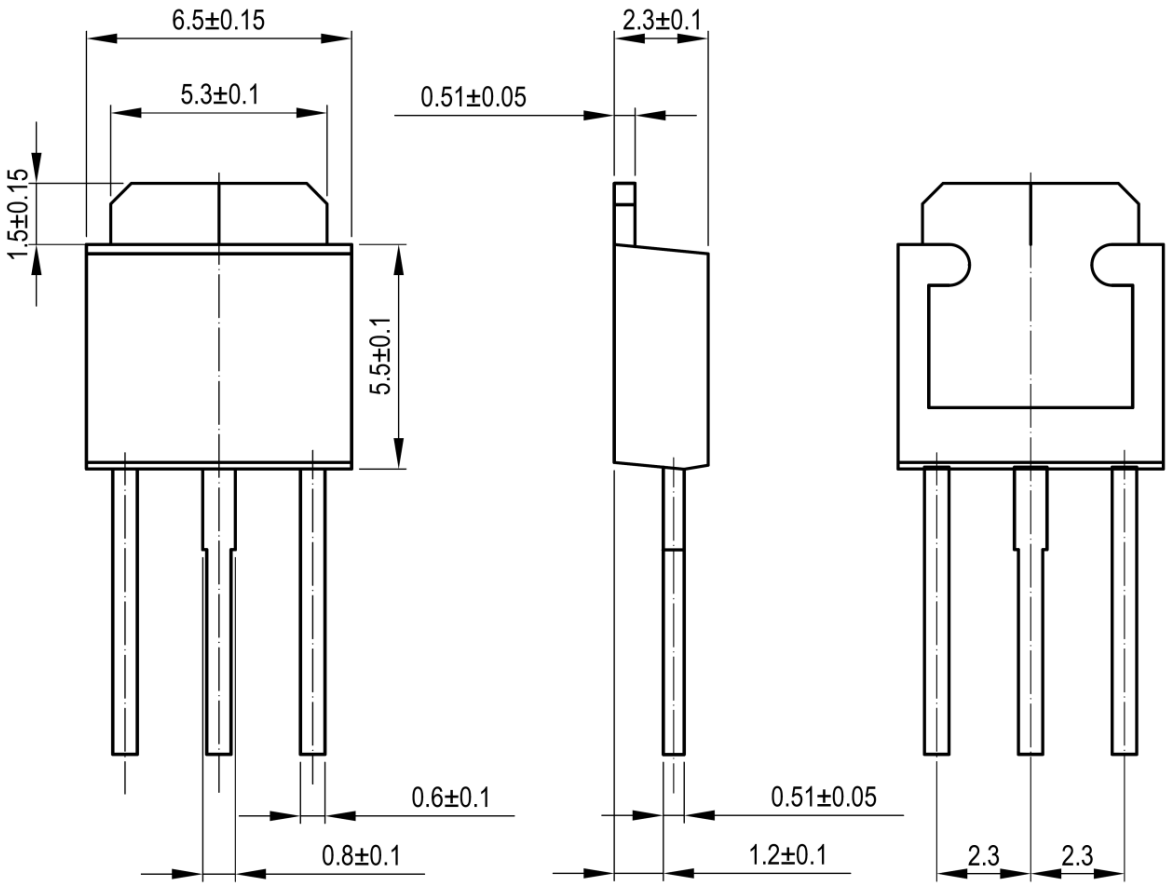


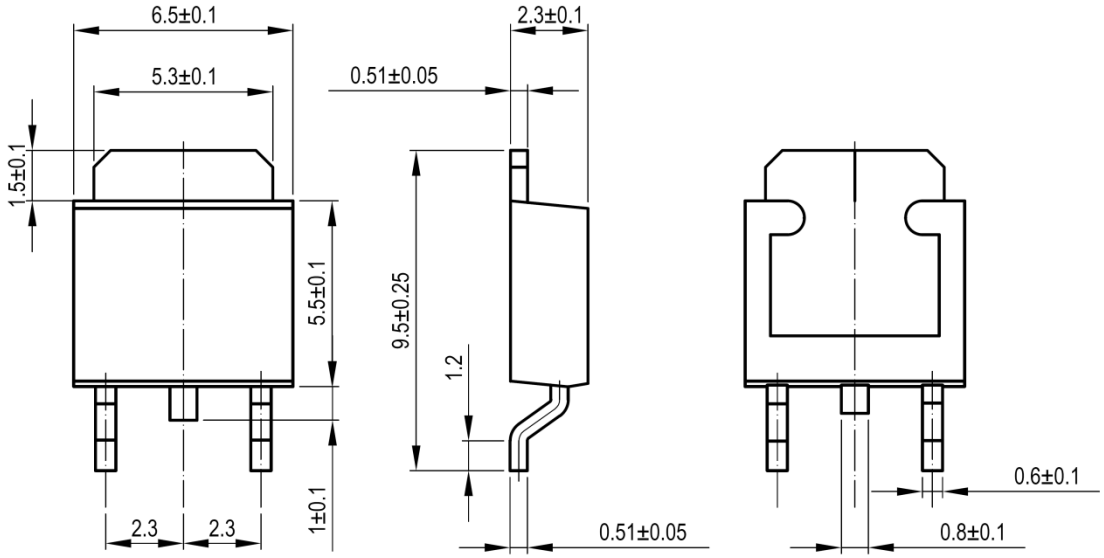
Figure 22. Diode Reverse Recovery Waveform

Package Dimensions

TO-251



TO-252


6.5±0.1
5.3±0.1
1.5±0.1
5.5±0.1
1±0.1
2.3
2.3
2.3±0.1
0.51±0.05
9.5±0.25
1.2
0.51±0.05
0.6±0.1
0.8±0.1