

600V N-Channel MOSFET

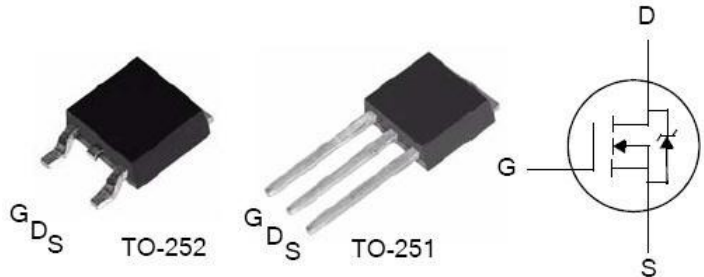
General Features

- 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

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



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

$T_C=25^{\circ}\text{C}$ 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°C}	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°C	0.23		W/°C
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		°C
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 _{θJC}	Thermal Resistance, Junction-to-Case	4.3		°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	100		

Electrical Characteristics

OFF Characteristics

 $T_C = 25^\circ\text{C}$ unless otherwise specified

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

ON Characteristics

 $T_C = 25^\circ\text{C}$ 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	$V_{DS} = V_{GS}, I_D=250\mu A$
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	$V_{DD}=300V$ $I_D=1.0A$ $V_{GS}=10V$ $R_G=20\Omega$
t_{rise}	Rise Time	--	13	--		
$t_{d(OFF)}$	Turn-off Delay Time	--	13	--		
t_{fall}	Fall Time	--	27	--		

Source-Drain Diode Characteristics
 $T_C=25^{\circ}\text{C}$ 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	$I_S=1.0\text{A}$, $V_{GS}=0\text{V}$
t_{rr}	Reverse Recovery Time	--	127	--	ns	$V_{GS}=0\text{V}$ $I_F=1.0\text{A}$, $di/dt=100\text{A}/\mu\text{s}$
Q_{rr}	Reverse Recovery Charge	--	310	--	nC	

NOTE:

[1] $T_J=+25^{\circ}\text{C}$ to $+150^{\circ}\text{C}$

[2] Repetitive rating, pulse width limited by maximum junction temperature.

[3] $I_{SD}=1.0\text{A}$, $di/dt \leq 100\text{A}/\mu\text{s}$, $V_{DD} \leq BV_{DSS}$, $T_J=+150^{\circ}\text{C}$

[4] Pulse width $\leq 380\mu\text{s}$; duty cycle $\leq 2\%$.

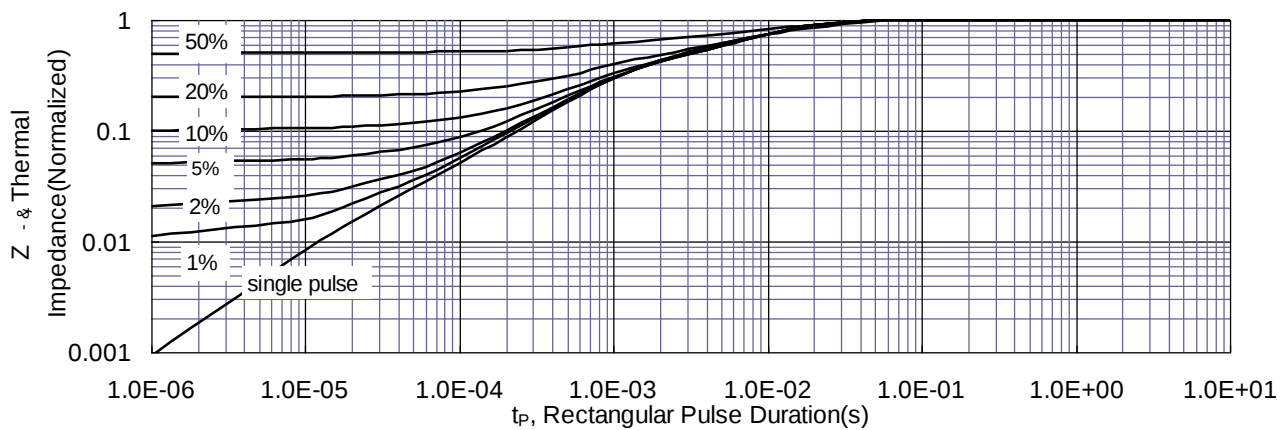
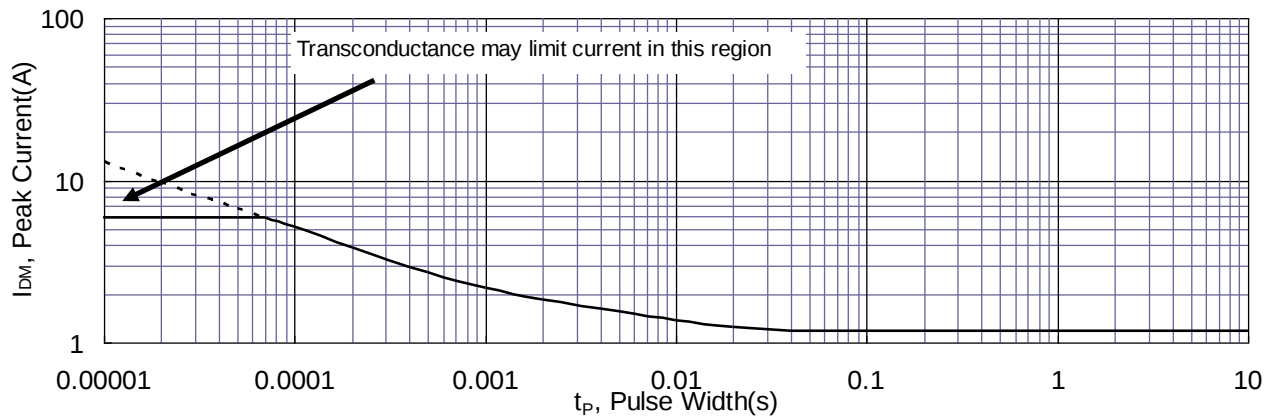
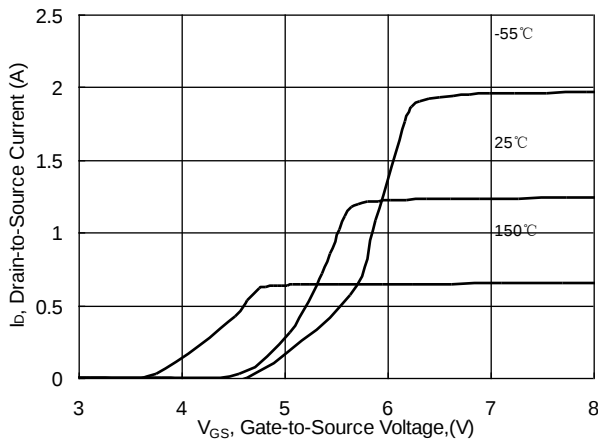
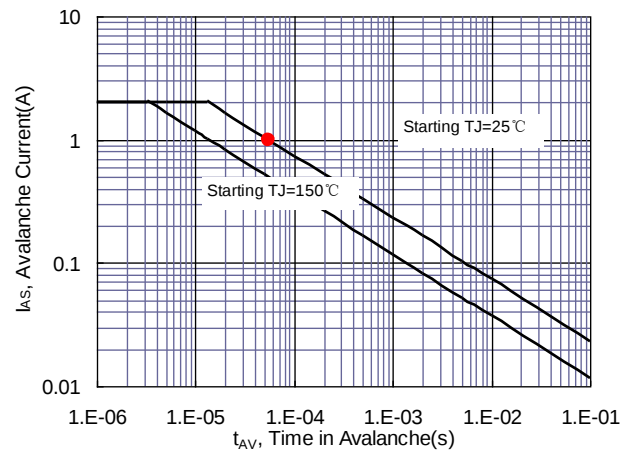
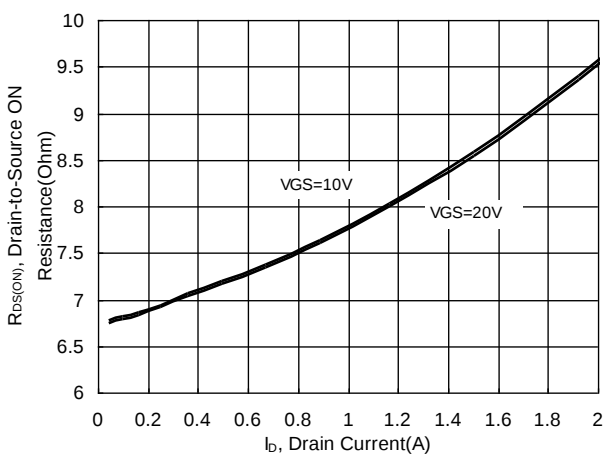
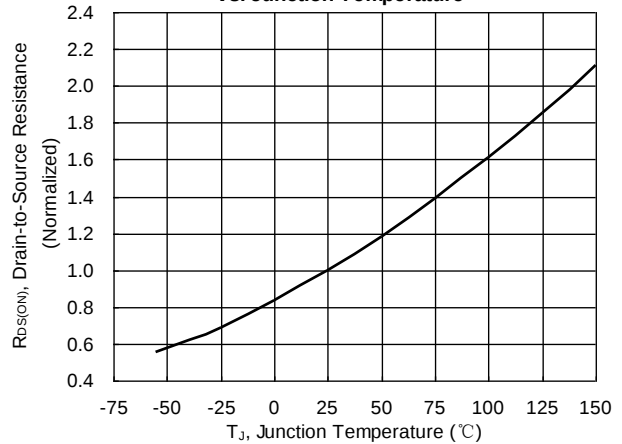
Figure 1. Maximum Effective Thermal Impedance, Junction-to-Case


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


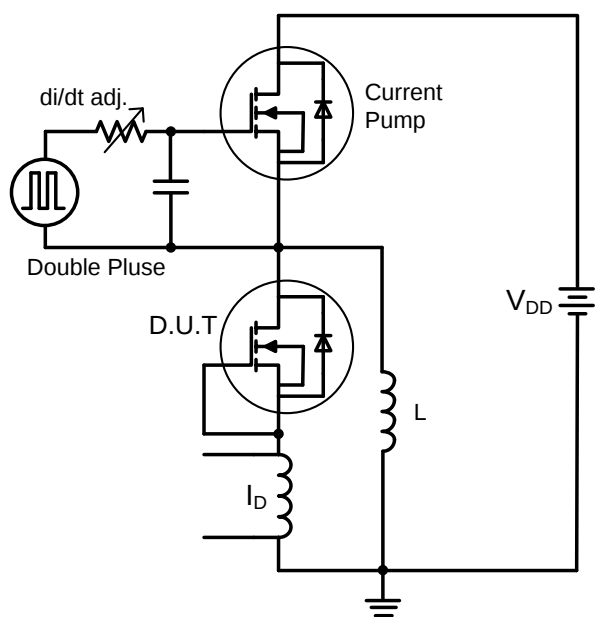


Figure 21. Diode Reverse Recovery Test Circuit

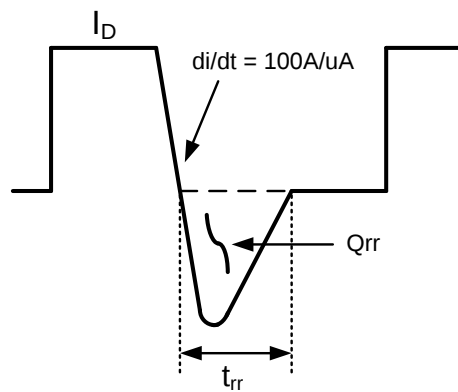
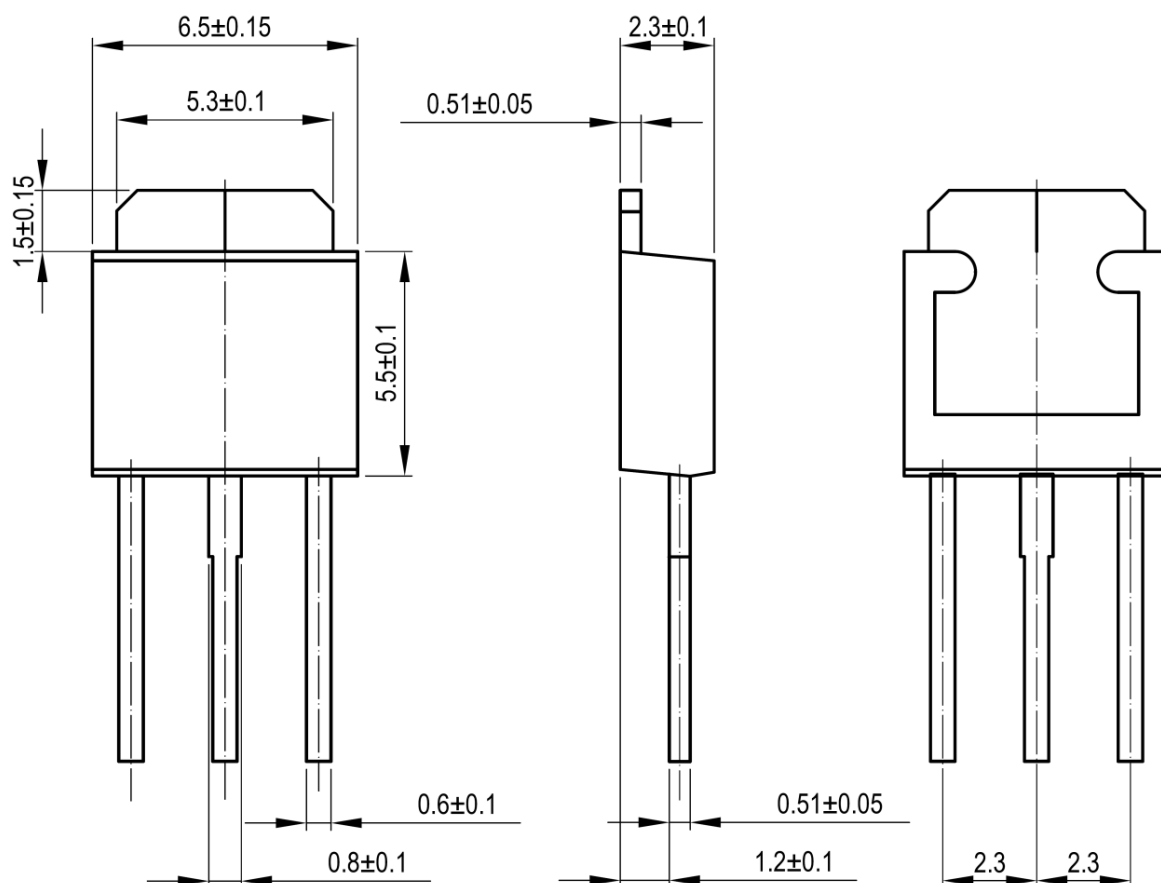


Figure 22. Diode Reverse Recovery Waveform

Package Dimensions
TO-251


TO-252
