

**N Channel MOSFET (Deep Trench Superjunction)**


Lead Free Package and Finish

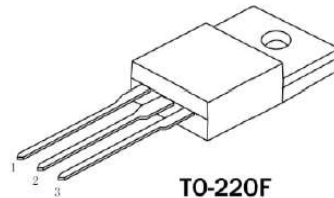
**Applications:**

- Adapter & Charger
- SMPS Standby Power
- AC-DC Switching Power Supply
- LED driving power

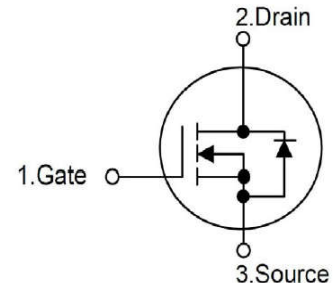
$I_D$	$R_{DS(ON)}$ (Typ.)	$V_{DSS}$
4.0A	0.84 $\Omega$	600V

**Features:**

- Low On Resistance
- Low Gate Charge
- Peak Current vs Pulse Width Curve
- Proprietary New Super Junction Technology
- RoHS Compliant


**TO-220F**

Not to Scale


**Ordering Information**

Part Number	Package	Marking
RSU4N60F	TO-220F	RSU4N60F

**Absolute Maximum Ratings  $T_c=25^\circ\text{C}$  unless otherwise specified**

Symbol	Parameter	RSU4N60F	Units
$V_{DSS}$	Drain-to-Source Voltage (Note*1)	600	V
$I_D$	Continuous Drain Current	4.0	A
$I_{DM}$	Pulsed Drain Current (Note*2)	12.0	
PD	Power Dissipation	32	W
VGS	Gate-to-Source Voltage	$\pm 30$	V
EAS	Single Pulse Avalanche Energy L=10mH $V_{DD}=50V$ $T_J=25^\circ\text{C}$	20	mJ
TL TPKG	Maximum Temperature for Soldering	300 260	$^\circ\text{C}$
	Leads at 0.063in(1.6mm) from Case for 10 seconds		
	Package Body for 10 seconds		
$T_J$ and $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to 150	

\*Drain Current Limited by Maximum Junction Temperature

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

**Thermal Resistance**

Symbol	Parameter	RSU4N60F	Units	Test Conditions
$R_{\theta JC}$	Junction-to-Case	3.9	$^\circ\text{C}/\text{W}$	Drain lead soldered to water cooled heatsink, PD adjusted for a peak junction temperature of $+150^\circ\text{C}$ .
$R_{\theta JA}$	Junction-to-Ambient	100		1 cubic foot chamber, free air.

**OFF Characteristics**  $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
BV <sub>DSS</sub>	Drain-to-source Breakdown Voltage	600	---	---	V	V <sub>GS</sub> =0V, I <sub>D</sub> =250 $\mu$ A
I <sub>DSS</sub>	Drain-to-Source Leakage Current	---	---	1.0	$\mu$ A	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V
I <sub>GSS</sub>	Gate-to-Source Forward Leakage	---	---	100	nA	V <sub>GS</sub> =+30V V <sub>DS</sub> =0V
	Gate-to-Source Reverse Leakage	---	---	-100		V <sub>GS</sub> =-30V V <sub>DS</sub> =0V

**ON Characteristics**  $T_J=25^{\circ}\text{C}$  unless otherwise specified

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
R <sub>DS(on)</sub>	Static Drain-to-Source On-Resistance	---	0.84	0.90	$\Omega$	V <sub>GS</sub> =10V, I <sub>D</sub> =2A
V <sub>GS(TH)</sub>	Gate Threshold Voltage	2.0	---	4.0	V	V <sub>GS</sub> =V <sub>DS</sub> , I <sub>D</sub> =250 $\mu$ A

**Resistive Switching Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
t <sub>d(ON)</sub>	Turn-on Delay Time	---	8.0	---	nS	V <sub>DS</sub> =480V I <sub>D</sub> =4.0A R <sub>G</sub> =25 $\Omega$ (Note:3, 4)
t <sub>rise</sub>	Rise Time	---	6.0	---		
t <sub>d(OFF)</sub>	Turn-OFF Delay Time	---	35	---		
t <sub>fall</sub>	Fall Time	---	20	---		

**Dynamic Characteristics** Essentially independent of operating temperature

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
C <sub>iss</sub>	Input Capacitance	---	350	---	pF	V <sub>GS</sub> =0V
C <sub>oss</sub>	Output Capacitance	---	40	---		V <sub>DS</sub> =50V
C <sub>rss</sub>	Reverse Transfer Capacitance	---	4	---		f=1.0MHz
Q <sub>g</sub>	Total Gate Charge	---	7	---	nC	V <sub>DS</sub> =480V
Q <sub>gs</sub>	Gate-to-Source Charge	---	1.5	---		I <sub>D</sub> =4.0A
Q <sub>gd</sub>	Gate-to-Drain("Miller") Charge	---	2.5	---		V <sub>GS</sub> =10V (Note:3, 4)

Source-Drain Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Test Conditions
$I_S$	Continuous Source Current	--	--	4.0	A	Integral pn-diode in MOSFET
$I_{SM}$	Maximum Pulsed Current	--	--	12.0	A	
$V_{SD}$	Diode Forward Voltage	--	0.9	1.2	V	$I_S=4.0A, V_{GS}=0V$
$t_{rr}$	Reverse Recovery Time	--	200	--	nS	$V_{GS}=0V, V_R=480V$ $I_S=4.0A, di/dt=100A/\mu s$
$Q_{rr}$	Reverse Recovery Charge	--	0.8	--	$\mu C$	

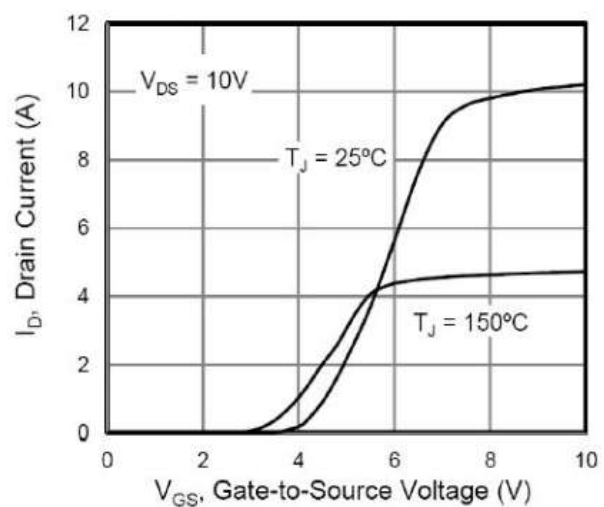
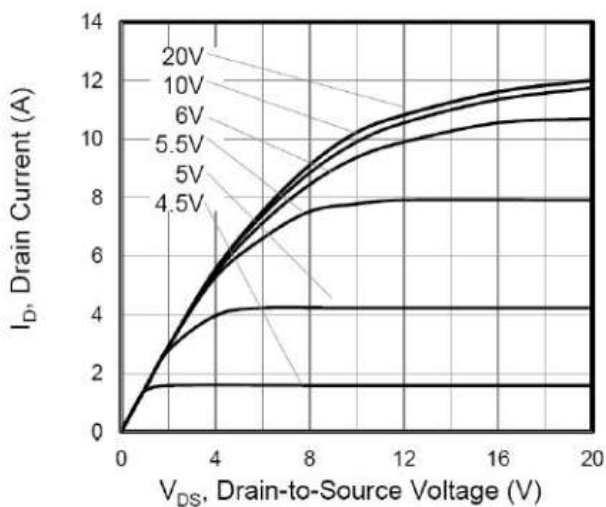
Notes:

- \*1.  $T_J = \pm 25^\circ C$  to  $+150^\circ C$ .
- \*2. Repetitive rating; pulse width limited by maximum junction temperature.
- \*3. Pulse width  $\leq 380\mu s$ ; duty cycle  $\leq 2\%$ .
- \*4. Basically not affected by temperature.

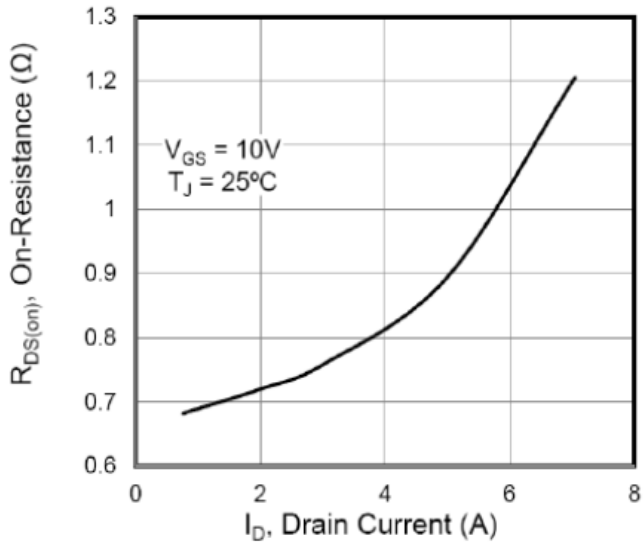
Typical Feature curve

Figure1. Typical Output Characteristics

Figure2. Typical Transfer Characteristics



Figuer3. Typical ON Resistance vs Drain Current



Figuer4. Typical Body Diode Transfer Characteristics

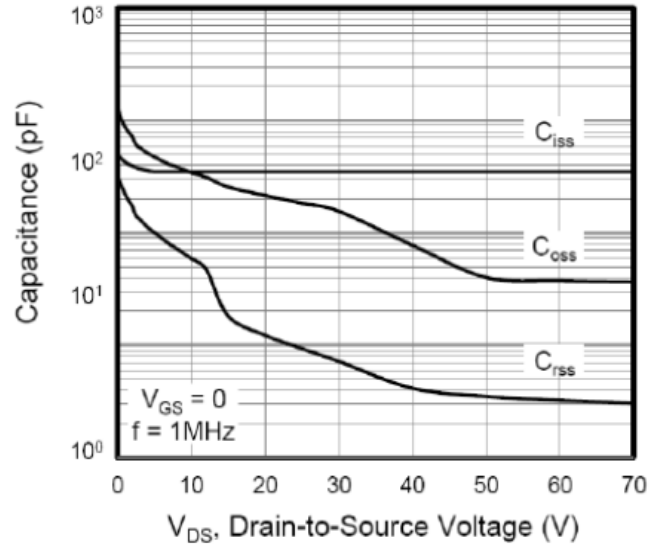


Figure5. Body Diode Forward Voltage

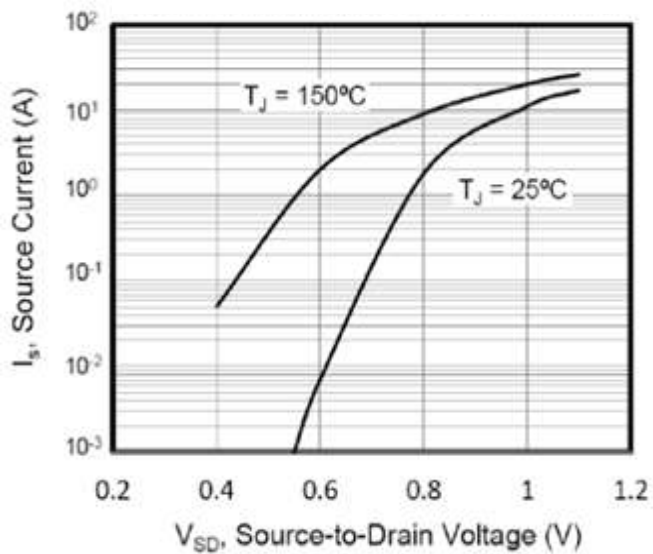


Figure6. Typical Gate Charge vs Gate-to-Source Voltage

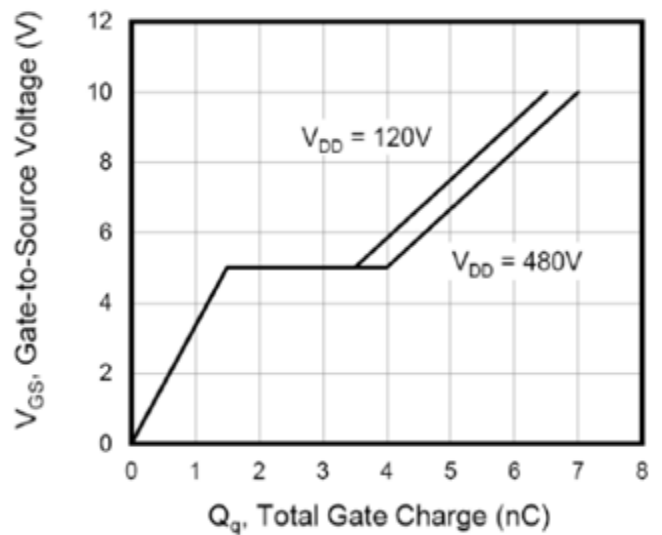


Figure7. Threshold Voltage vs Junction Temperature

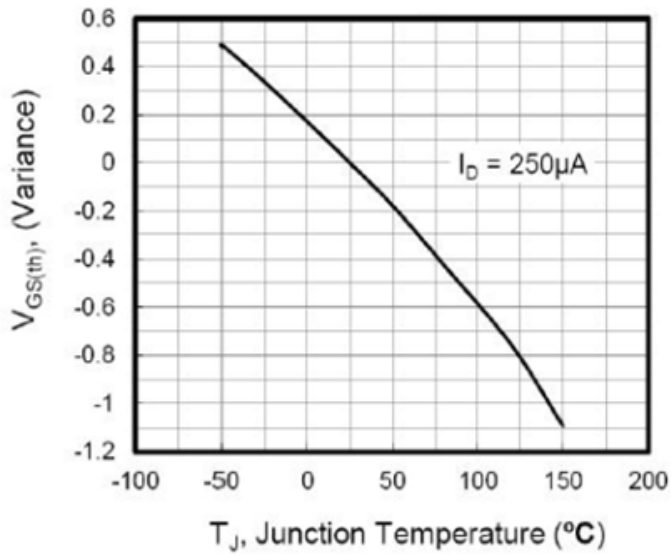
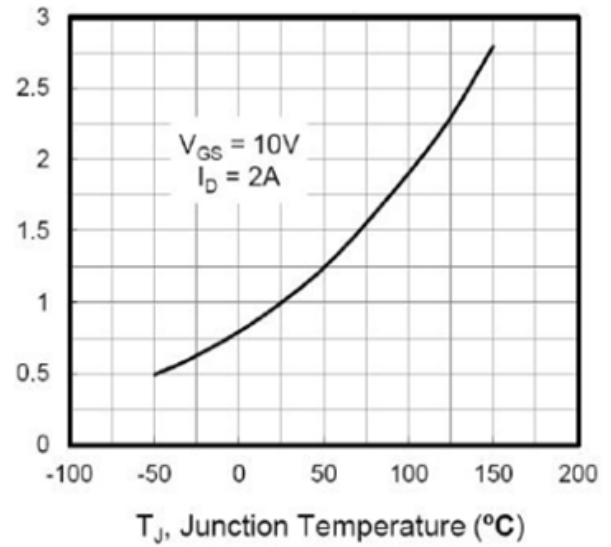
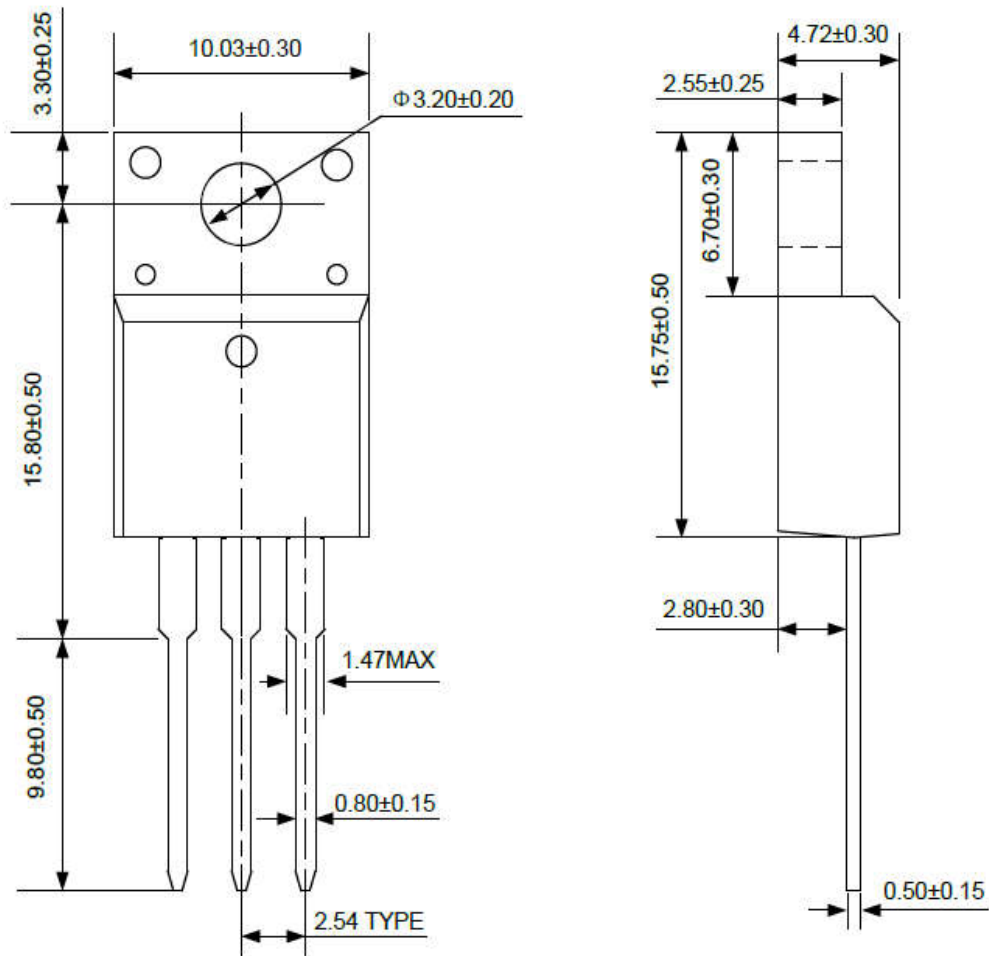


Figure8. Typical Drain-to-Source ON Resistance vs Junction Temperature



Package outline drawing



TO-220F

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