

## 11.5A 700V N-Channel Super Junction Power MOSFET

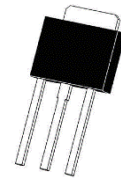
### DESCRIPTION :

- New technology for high voltage device
- Low on-resistance and low conduction losses
- Small package
- Ultra Low Gate Charge cause lower driving requirements
- 100% Avalanche Tested
- ROHS compliant

$V_{DS}$	700V
$I_D$	11.5A
$R_{DS(ON)_{Typ.}}$	330m $\Omega$

### TYPICAL APPLICATIONS :

- Power factor correction ( PFC )
- Switched mode power supplies(SMPS)
- Uninterruptible Power Supply ( UPS )



TO-251

### MAXIMUM RATINGS (at $T_c = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

Characteristic	Condition	Symbol	Value	Unit
Drain-Source Voltage		$V_{DS}$	700	V
Gate-Source Voltage		$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$T_c=25^\circ\text{C}$ $T_c=100^\circ\text{C}$	$I_D$	11.5 7	A
Pulsed Drain Current <sup>(1)</sup>		$I_{D\ pulse}$	46	A
Maximum Power Dissipation	$T_c=25^\circ\text{C}$ $T_A=25^\circ\text{C}$	$P_{tot}$	101 0.97	W
Single Pulsed Avalanche Energy	$V_{DD}=50\text{V}, V_G=10\text{V}, R_g=25\Omega$	EAS	144	mJ
Avalanche current		$I_{AR}$	6	A
Repetitive Avalanche energy	$t_{AR}$ limited by $T_{jmax}$	$E_{AR}$	0.5	mJ
Drain Source voltage slope	$V_{DS} \leq 480\text{ V}$	dv/dt	50	V/ns
Reverse diode dv/dt	$V_{DS} \leq 480\text{ V}, I_{SD} < I_D$	dv/dt	15	V/ns
Junction & Storage temperature Range		$T_J, T_{STG}$	-55~+150	$^\circ\text{C}$

Notes : 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

## THERMAL CHARACTERISTICS

Characteristic	Condition	Symbol	Value	Unit
Thermal resistance,	Junction to Ambient	$R_{\theta JA}$	62	$^{\circ}\text{C}/\text{W}$
	Junction to Case	$R_{\theta JC}$	1.24	

ELECTRICAL CHARACTERISTICS (at  $T_J = 25^{\circ}\text{C}$ , unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage $V_{GS} = 0\text{V}$ , $I_D = 250\mu\text{A}$	$BV_{DSS}$	700			V
Zero Gate Voltage Drain Current $V_{DS} = 700\text{V}$ , $V_{GS} = 0\text{V}$ , $T_J = 25^{\circ}\text{C}$ $V_{DS} = 700\text{V}$ , $V_{GS} = 0\text{V}$ , $T_J = 125^{\circ}\text{C}$	$I_{DSS}$		0.05	1 100	$\mu\text{A}$
Gate-Source Leakage Current $V_{GS} = \pm 20\text{V}$ , $V_{DS} = 0\text{V}$	$I_{GSS}$			$\pm 100$	nA
Gate-Source threshold voltage $V_{DS} = V_{GS}$ , $I_D = 250\mu\text{A}$	$V_{GS(th)}$	3	3.5	4	V
Drain-Source On-State Resistance $V_{GS} = 10\text{V}$ , $I_D = 7\text{A}$	$R_{DS(on)}$		330	390	m $\Omega$
Input capacitance $f = 1\text{MHz}$ , $V_{DS} = 50\text{V}$ , $V_{GS} = 0\text{V}$	$C_{iss}$		870		pF
Output capacitance $f = 1\text{MHz}$ , $V_{DS} = 50\text{V}$ , $V_{GS} = 0\text{V}$	$C_{oss}$		54		pF
Reverse transfer capacitance $f = 1\text{MHz}$ , $V_{DS} = 50\text{V}$ , $V_{GS} = 0\text{V}$	$C_{rss}$		1.8		pF
Total Gate Charge $V_{DS} = 480\text{V}$ , $I_D = 11.5\text{A}$ , $V_{GS} = 10\text{V}$	$Q_G$		19		nC
Gate to Source Charge $V_{DS} = 480\text{V}$ , $I_D = 11.5\text{A}$ , $V_{GS} = 10\text{V}$	$Q_{GS}$		6		nC
Gate to Drain Charge $V_{DS} = 480\text{V}$ , $I_D = 11.5\text{A}$ , $V_{GS} = 10\text{V}$	$Q_{GD}$		6.5		nC
Turn-on delay time $V_{DD} = 420\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 5.5\text{A}$ , $R_G = 3\Omega$	$t_{d(ON)}$		12		ns
Rise time $V_{DD} = 420\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 5.5\text{A}$ , $R_G = 3\Omega$	$t_r$		9		ns
Turn-off delay time $V_{DD} = 420\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 5.5\text{A}$ , $R_G = 3\Omega$	$t_{d(OFF)}$		61	70	ns
Fall time $V_{DD} = 420\text{V}$ , $V_{GS} = 10\text{V}$ , $I_D = 5.5\text{A}$ , $R_G = 3\Omega$	$t_f$		11	14	ns

## Body Diode

ELECTRICAL CHARACTERISTICS (at  $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise specified)

Characteristic	Symbol	Min.	Typ.	Max.	Unit
Source-drain current	$I_{SD}$			11.5	A
Pulsed Source-drain current	$I_{SDM}$			46	A
Diode Forward Voltage $V_{GS} = 0V, I_{SD} = 11.5A$	$V_{SD}$		0.9	1.2	V
Revers Recovery Time $I_F = 5.8A, di/dt = 100A/us$	$T_{rr}$		220		nS
Revers Recovery Charge $I_F = 5.8A, di/dt = 100A/us$	$Q_{rr}$		2.2		$\mu C$
Peak Reverse Recovery Current $I_F = 5.8A, di/dt = 100A/us$	$I_{rm}$		19		A

Typical Performance Characteristics

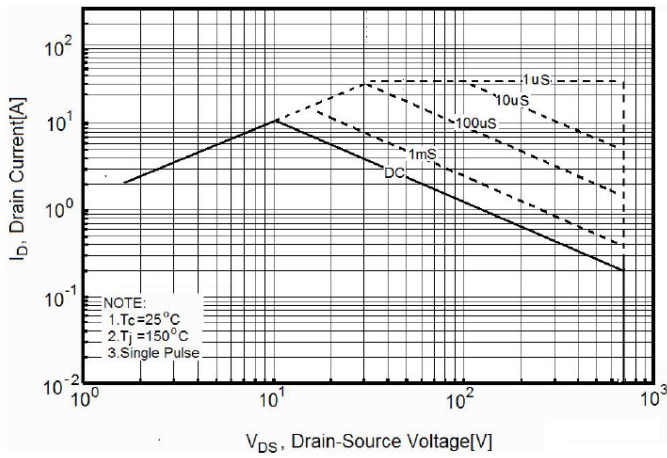


Figure 1. Safe operating area

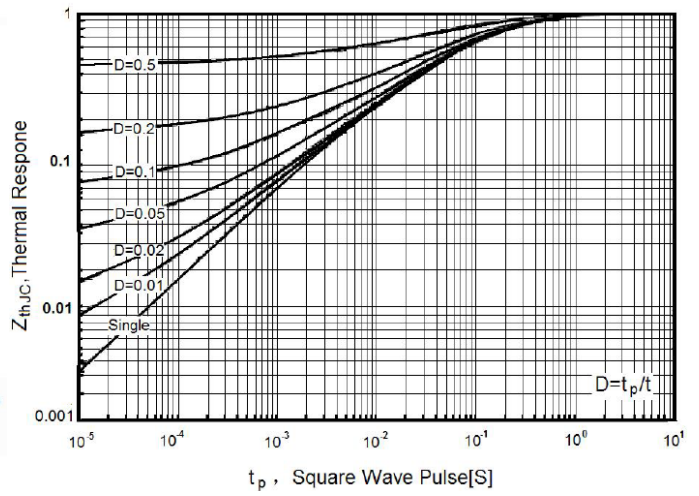


Figure 2. Transient Thermal Impedance

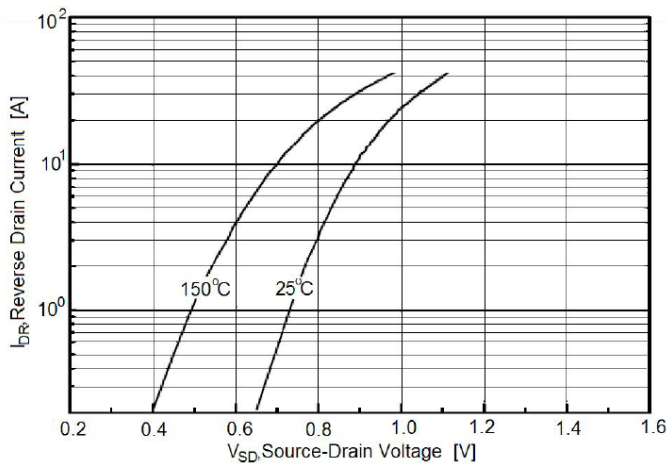


Figure 3. Source-Drain Diode Forward Voltage

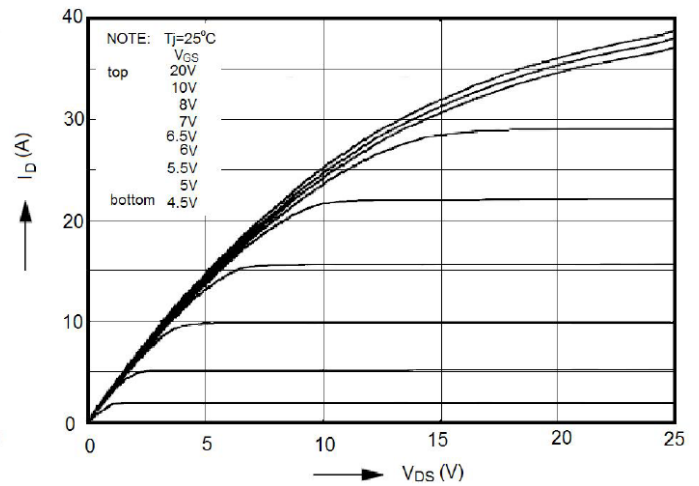


Figure 4. Output characteristics

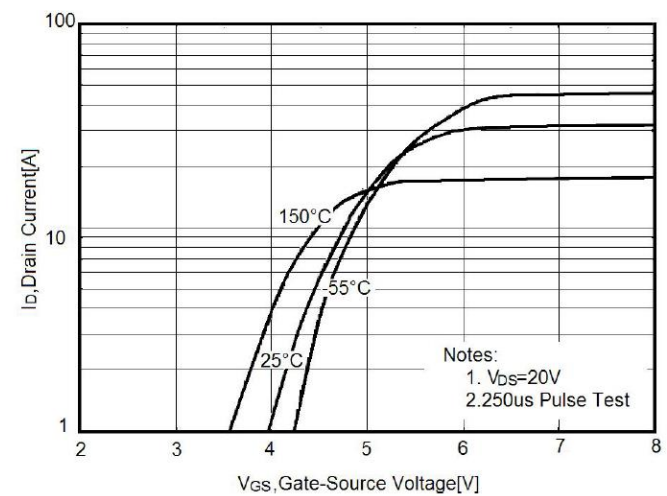


Figure 5. Transfer characteristics

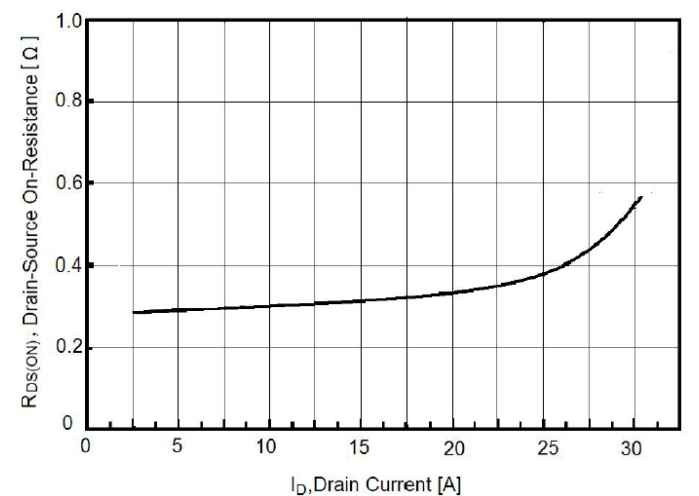


Figure 6. Static drain-source on resistance

Typical Performance Characteristics

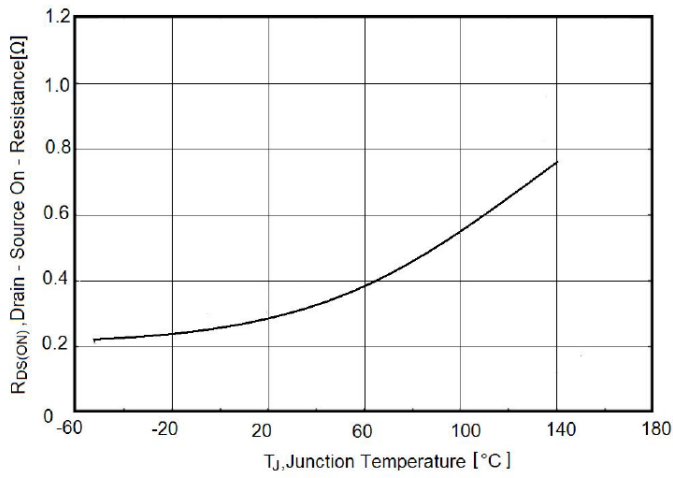


Figure 7.  $R_{DS(ON)}$  vs Junction Temperature

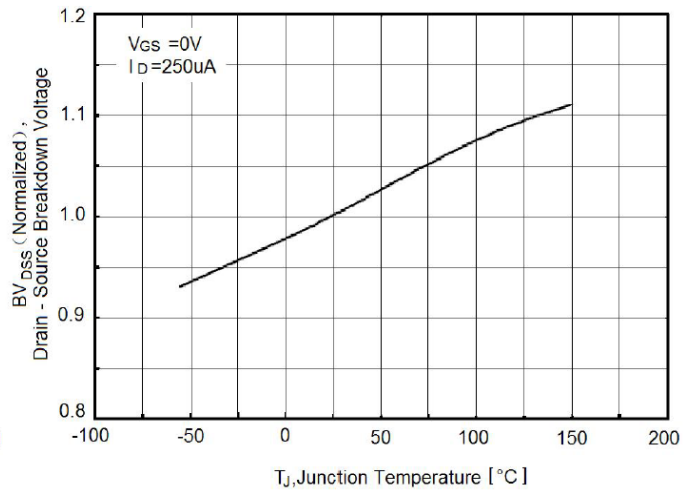


Figure 8.  $BV_{DS}$  vs Junction Temperature

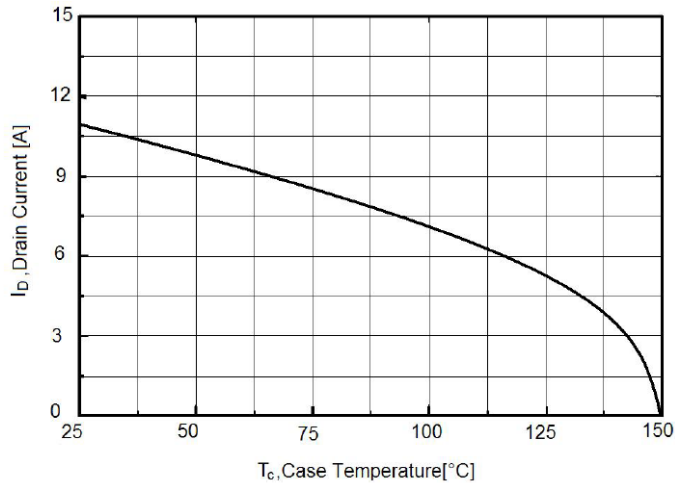


Figure 9. Maximum  $I_D$  vs Junction Temperature

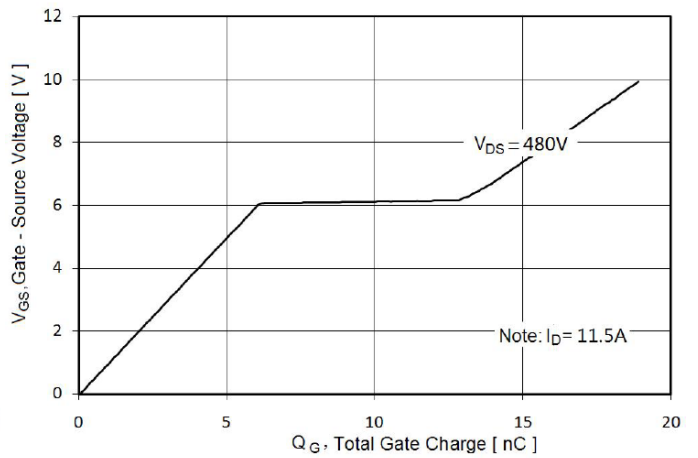


Figure 10. Gate charge waveforms

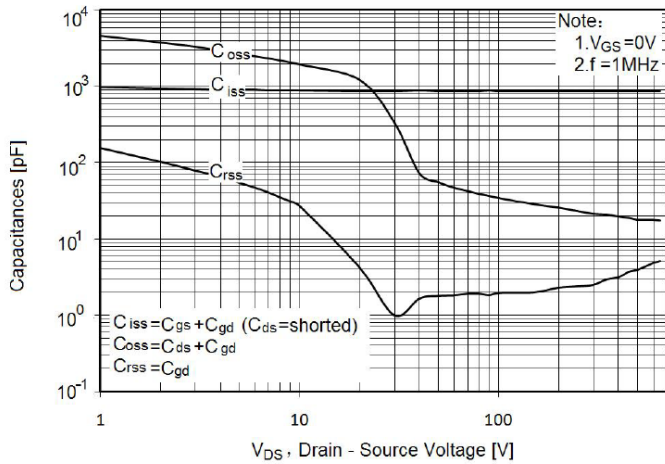
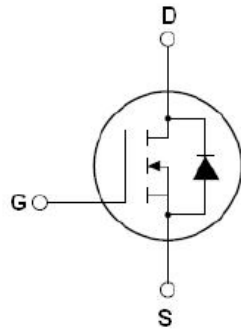
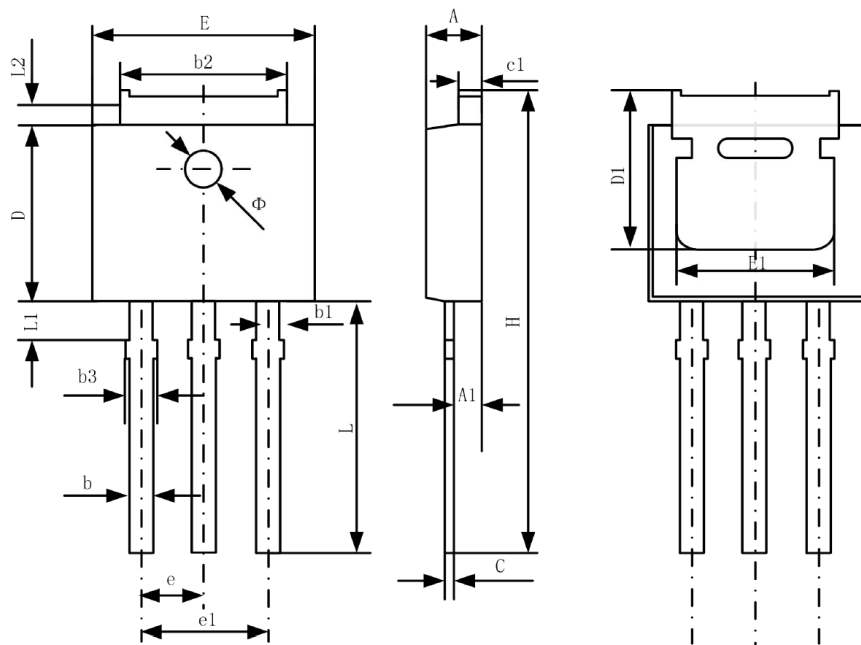


Figure 11. Capacitance

·Circuit diagram



·Package outlines : Dimensions in (mm)



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.20	2.35	0.087	0.093
A1	0.90	1.10	0.035	0.043
b	0.56	0.69	0.022	0.027
b1	0.77	0.90	0.030	0.035
b2	5.23	5.43	0.206	0.214
b3		1.05	0.000	0.041
C	0.46	0.59	0.018	0.023
c1	0.46	0.59	0.018	0.023
D	6.00	6.20	0.236	0.244
D1	5.20		0.205	
E	6.50	6.70	0.256	0.264
E1	4.60	5.00	0.181	
e	2.24	2.34	0.088	0.092
e1	4.47	4.67	0.176	0.184
H	16.18	16.78	0.637	0.661
L	9.00	9.60	0.354	0.378
L1	0.95	1.35	0.037	0.053
L2	0.90	1.25	0.035	0.049

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