1000V Super-Junction Power MOSFET

DESCRIPTION

1000V super-junction Power MOSFET

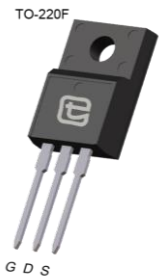
Super-junction power MOSFET is a revolutionary technology for high voltage power MOSFETs, designed according to the SJ principle. The SJ MOSFET is a price-performance optimized product enabling to target cost sensitive applications in Consumer and Lighting markets, designed by Wuxi Unigroup Microelectronics Company.

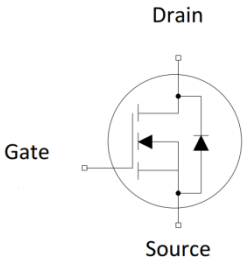
FEATURES

- Very low FOM $R_{DS(on)} \times Q_g$
- 100% avalanche tested
- RoHS compliant

APPLICATIONS

- Switch Mode Power Supply (SMPS)
- Uninterruptible Power Supply (UPS)
- Power Factor Correction (PFC)





RoHS

Device Marking and Package Information

Device	Package	Marking
TPA100R500A	TO-220F	100R500A

Key Performance Parameters

Parameter	Value	Unit
V_{DS} @ $T_{j,max}$	1000	V
$R_{DS(on),max}$	0.5	Ω
I_D	12	A
$Q_{g,typ}$	60	nC
I_{DM}	36	A

Absolute Maximum Ratings T_C = 25ºC, unless otherwise noted				
Parameter		**Symbol**	**Value**	**Unit**
Drain-Source Voltage (V_{GS} = 0V)		V_{DSS}	1000	V
Continuous Drain Current	T_C = 25ºC	I_D	12	A
	T_C = 100ºC		7.2	
Pulsed Drain Current (note1)		I_{DM}	36	A
Gate-Source Voltage		V_{GSS}	±30	V
Single Pulse Avalanche Energy (note2)		E_{AS}	80	mJ
Avalanche Current		I_{AS}	4	A
Power Dissipation		P_D	34	W
Continuous Body Diode Current		I_S	12	A
Pulsed Diode Forward Current (note1)		I_{SM}	36	
MOSFET dv/dt ruggedness, V_{DS} = 0...960V		dv/dt	50	V/ns
Reverse diode dv/dt, V_{DS} = 0…960V, $I_{SD} \le I_D$		dv/dt	5	A/us
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+150	ºC

Thermal Resistance			
Parameter	**Symbol**	**Value**	**Unit**
Thermal Resistance, Junction-to-Case	R_{thJC}	3.67	ºC/W
Thermal Resistance, Junction-to-Ambient	R_{thJA}	80	

Specifications T_J = 25ºC, unless otherwise noted						
Parameter	**Symbol**	**Test Conditions**	**Value**			**Unit**
			Min.	**Typ.**	**Max.**	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0V, I_D = 250μA	1000	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 1000V, V_{GS} = 0V, T_J = 25ºC	--	--	1	μA
		V_{DS} = 1000V, V_{GS} = 0V, T_J = 150ºC	--	--	100	
Gate-Source Leakage	I_{GSS}	V_{GS} = ±30V	--	--	±100	nA
Gate-Source Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	2.5	--	4.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	V_{GS} = 10V, I_D = 3A	--	0.4	0.5	Ω
Forward Transconductance (Note3)	g_{fs}	V_{DS} = 10V, I_D = 4A	--	10	--	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0V, V_{DS} = 100V, f = 1.0MHz	--	2573	--	pF
Output Capacitance	C_{oss}		--	66	--	
Reverse Transfer Capacitance	C_{rss}		--	2.3	--	
Total Gate Charge	Q_g	V_{DD} = 400V, I_D = 4A, V_{GS} = 10V	--	60	--	nC
Gate-Source Charge	Q_{gs}		--	14	--	
Gate-Drain Charge	Q_{gd}		--	22	--	
Turn-on Delay Time	$t_{d(on)}$	V_{DD} = 400V, I_D = 4A, R_G = 25Ω	--	51	--	ns
Turn-on Rise Time	t_r		--	71	--	
Turn-off Delay Time	$t_{d(off)}$		--	154	--	
Turn-off Fall Time	t_f		--	67	--	
Drain-Source Body Diode Characteristics						
Body Diode Voltage	V_{SD}	T_J = 25ºC, I_{SD} = 4A, V_{GS} = 0V	--	0.9	1.2	V
Reverse Recovery Time	t_{rr}	V_R = 100V, I_F = I_S, di_F/dt = 100A/μs	--	675	--	ns
Reverse Recovery Charge	Q_{rr}		--	9	--	μC
Peak Reverse Recovery Current	I_{rrm}		--	25	--	A

Notes

1. Repetitive Rating: Pulse Width limited by maximum junction temperature
2. V_{DD} = 50V, R_G = 25Ω, Starting T_J = 25°C
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1%

Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 1. Output Characteristics

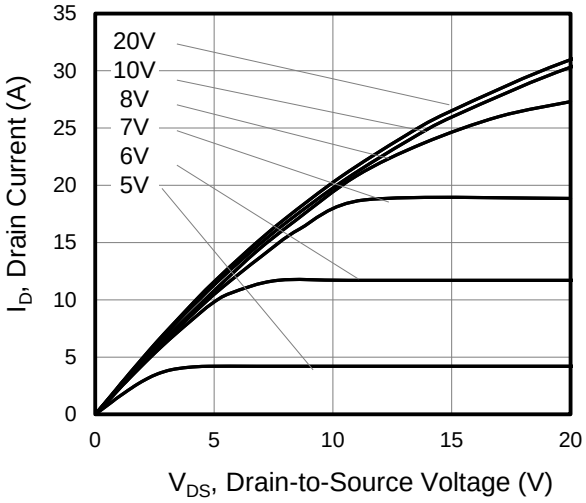


Figure 2. Transfer Characteristics

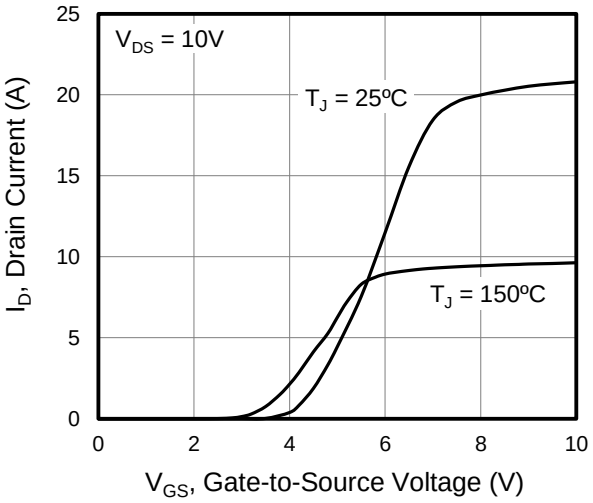


Figure 3. On-Resistance vs. Drain Current

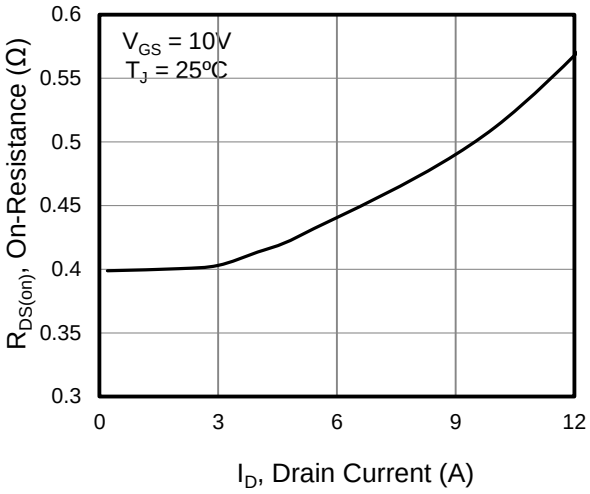


Figure 4. Capacitance

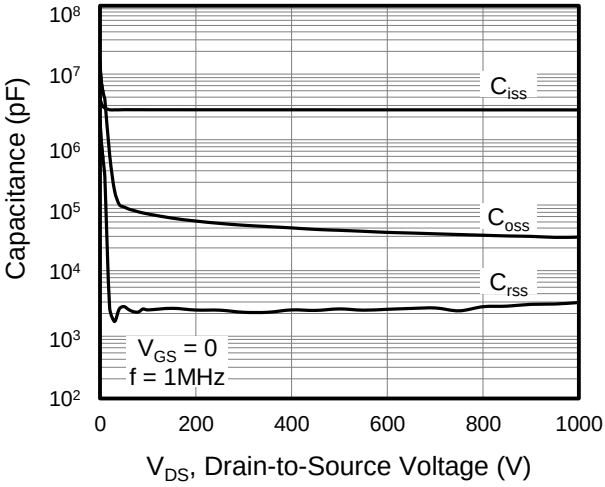


Figure 5. Gate Charge

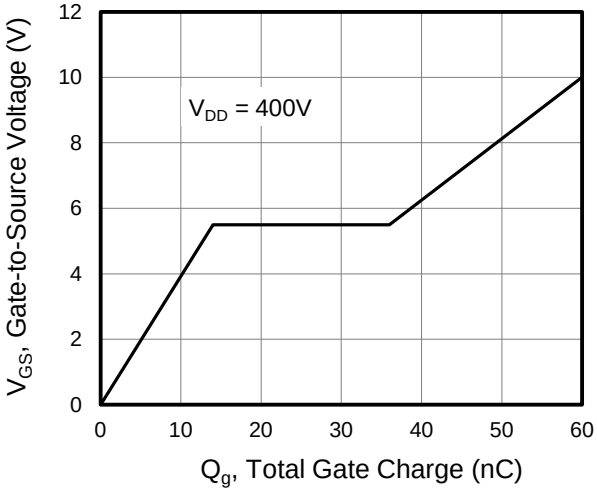
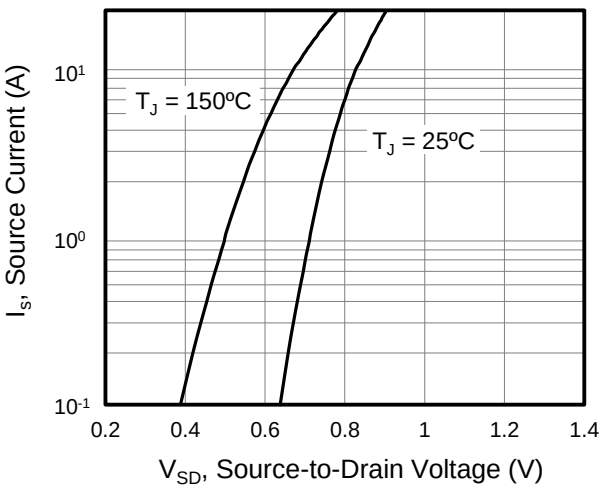


Figure 6. Body Diode Forward Voltage



Typical Characteristics T_J = 25ºC, unless otherwise noted

Figure 7. On-Resistance vs. Junction Temperature

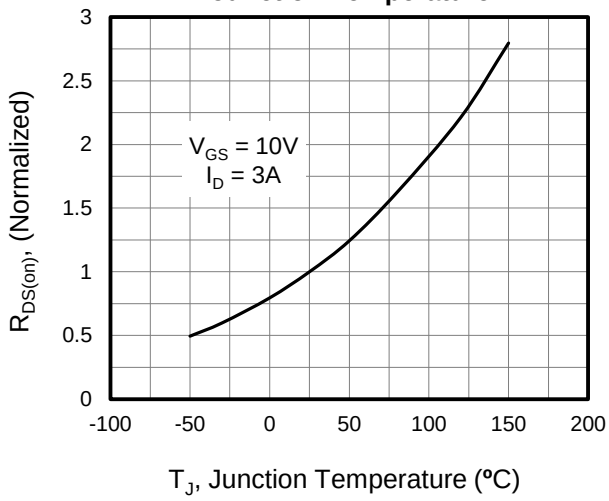


Figure 8. Breakdown voltage vs. Junction Temperature

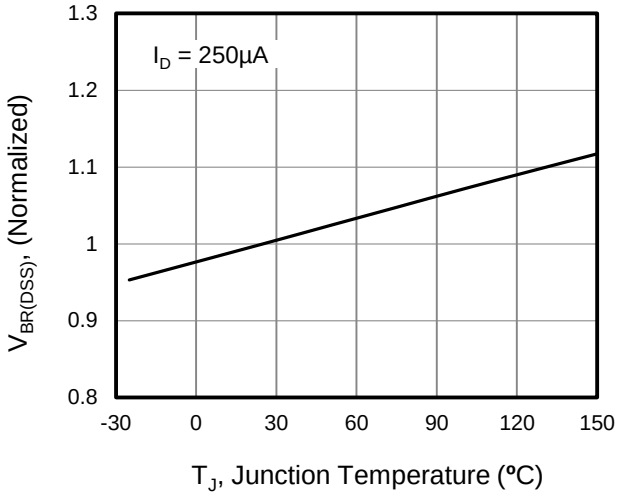


Figure 9. Transient Thermal Impedance

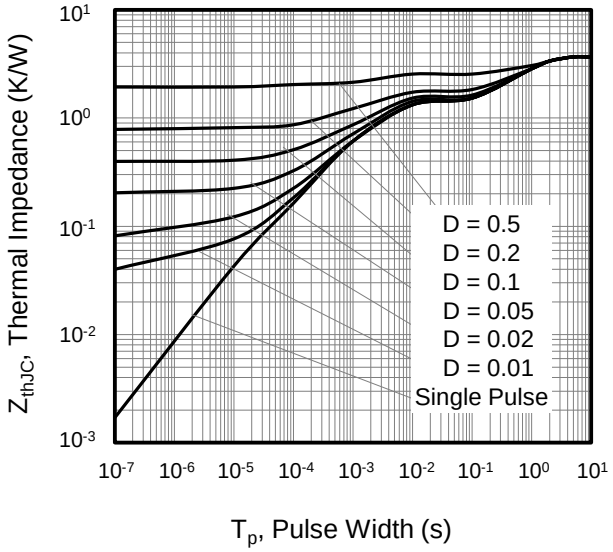


Figure 10. Safe operation area for

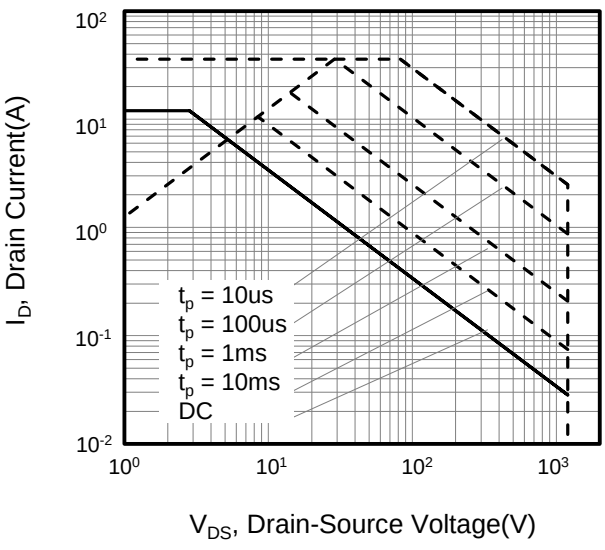


Figure A：Gate Charge Test Circuit and Waveform

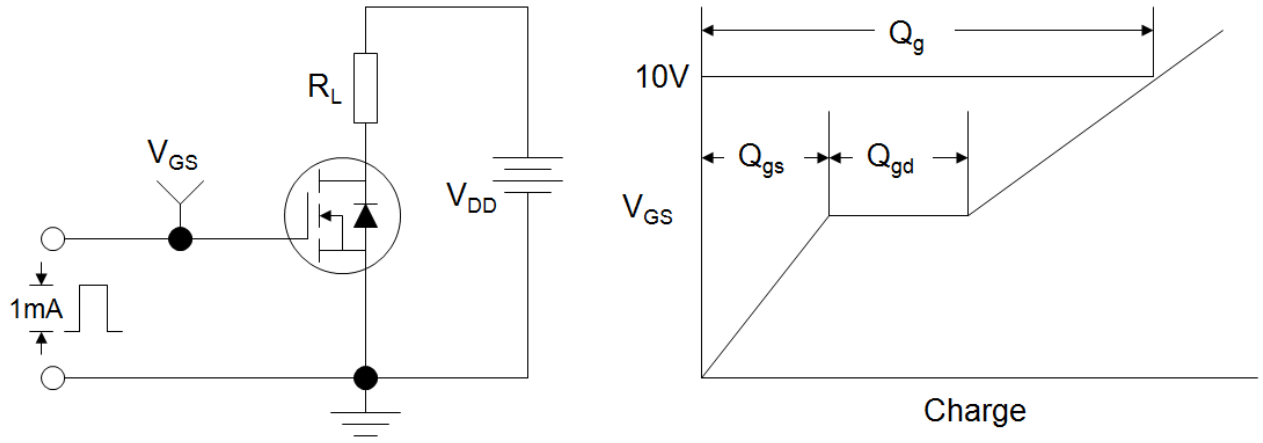


Figure B：Resistive Switching Test Circuit and Waveform

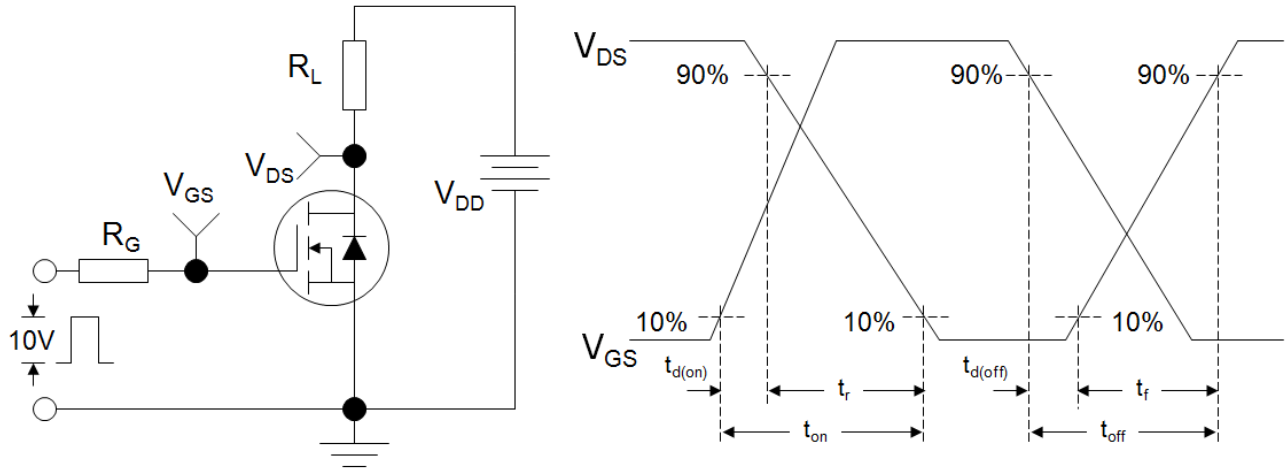
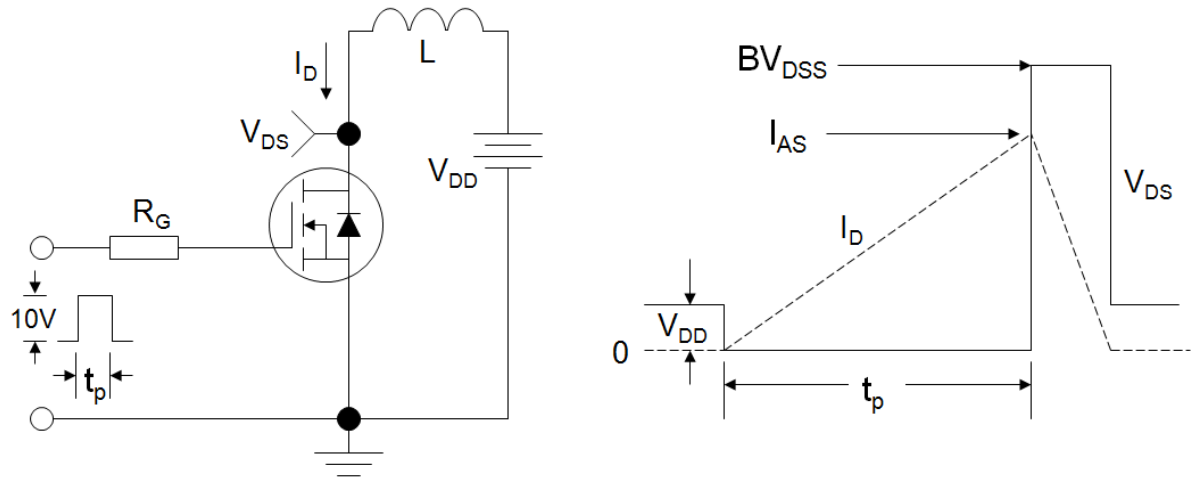
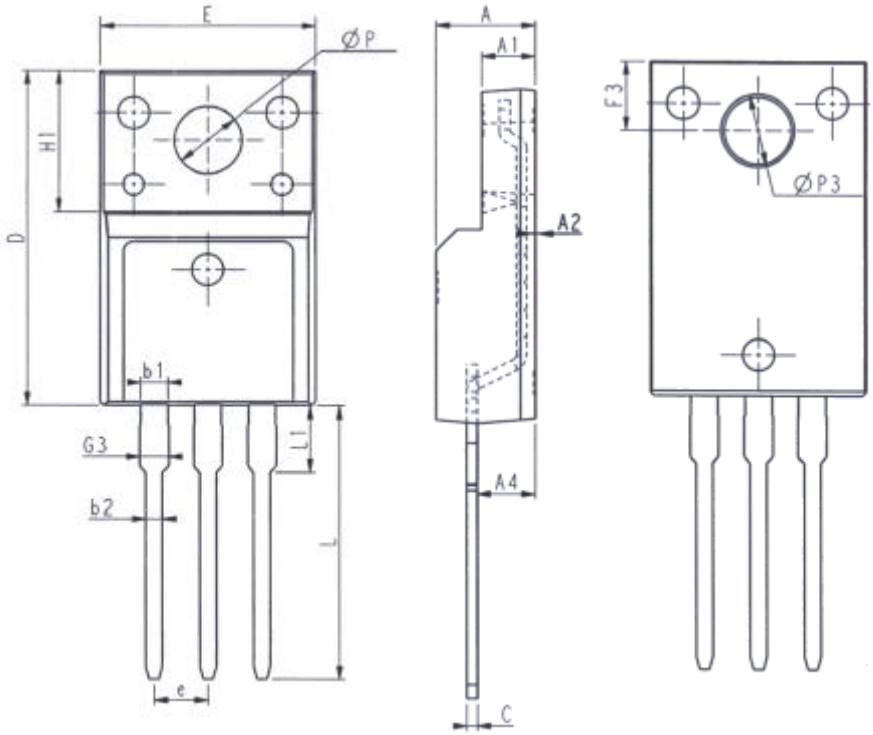


Figure C：Unclamped Inductive Switching Test Circuit and Waveform



TO-220F



Unit: mm		
Symbol	Min.	Max.
E	9.96	10.36
A	4.50	4.90
A1	2.34	2.74
A2	0.30	0.60
A4	2.56	2.96
c	0.40	0.65
D	15.57	16.17
H1	6.70REF	
e	2.54BSC	

Unit: mm		
Symbol	Min.	Max.
L	12.68	13.28
L1	2.93	3.13
P	3.03	3.38
P3	3.15	3.65
F3	3.15	3.45
G3	1.25	1.55
b1	1.18	1.43
b2	0.70	0.95

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