

## Features

- Super Junction technology for High Voltage Application
- Excellent package for heat dissipation
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free."Green" Device<sup>(Note 1)</sup>
- Lead Free Finish/RoHS Compliant<sup>(Note 2)</sup> ("P" Suffix Designates RoHS Compliant. See Ordering Information)

## Maximum Ratings

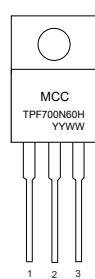
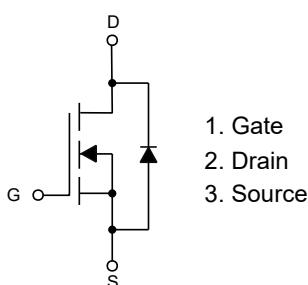
- Operating Junction Temperature Range : -55°C to +150°C
- Storage Temperature Range: -55°C to +150°C
- Thermal Resistance: 70°C/W Junction to Ambient<sup>(Note 3)</sup>
- Thermal Resistance: 4.2°C/W Junction to Case

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	635	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	V
Continuous Drain Current	$I_D$	3.96	A
$T_C=100^\circ C$		2.50	
Pulsed Drain Current <sup>(Note 4)</sup>	$I_{DM}$	15.84	A
Total Power Dissipation <sup>(Note 5)</sup>	$P_D$	29.7	W
Single Avalanche Energy <sup>(Note 6)</sup>	$E_{AS}$	60	mJ

Note:

1. Halogen free "Green" products are defined as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds.
2. High Temperature Solder Exemption Applied, see EU Directive Annex 7(a)-I.
3. The value of  $R_{\theta JA}$  is measured with the device mounted on 1in<sup>2</sup>FR-4 board with 2oz. Copper, in a still air environment with  $T_A=25^\circ C$ .
4. Repetitive rating; pulse width limited by max. junction temperature.
5.  $P_D$  is based on max. junction temperature, using junction-case thermal resistance.
6.  $T_J=25^\circ C$ ,  $V_{DD}=100V$ ,  $V_{GS}=10V$ ,  $R_G=25\Omega$ ,  $L=30mH$ .

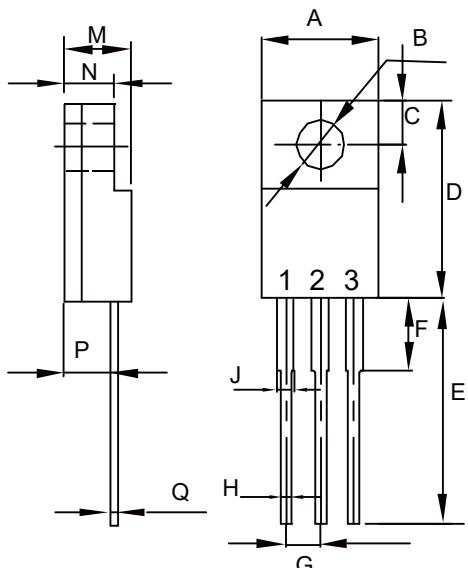
## Internal Structure and Marking Code



4 codes in total  
YY is the year  
WW is the week

# N-CHANNEL Super-Junction Power MOSFET

## TO-220F

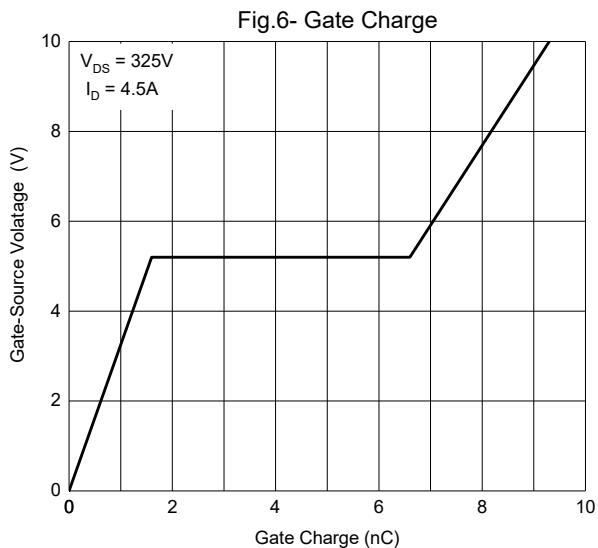
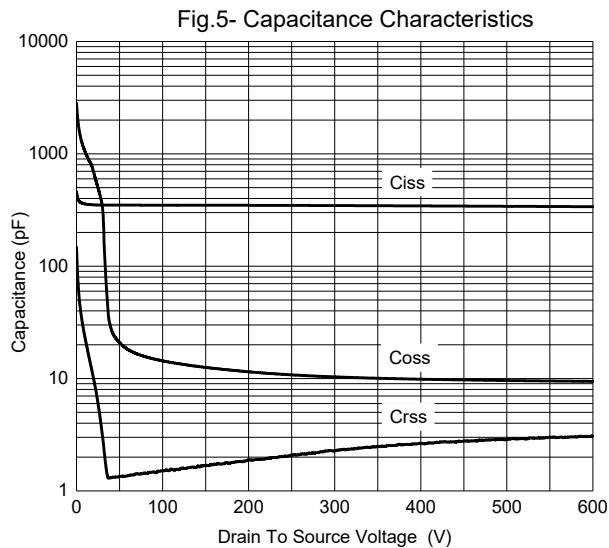
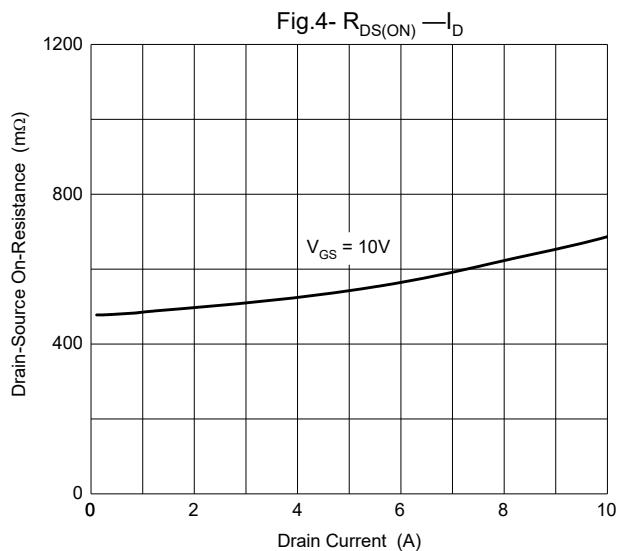
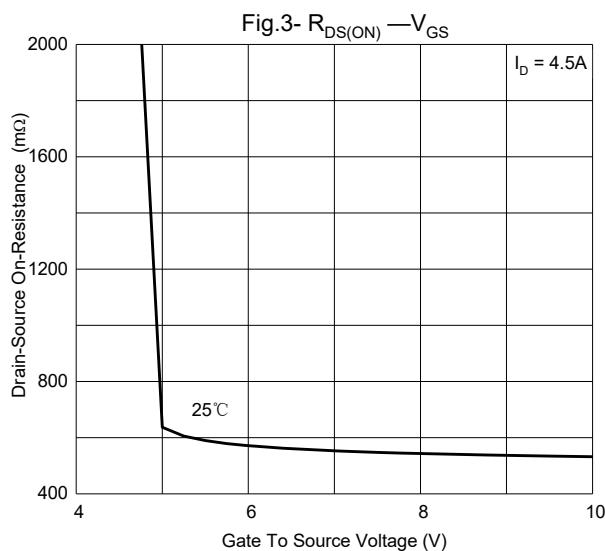
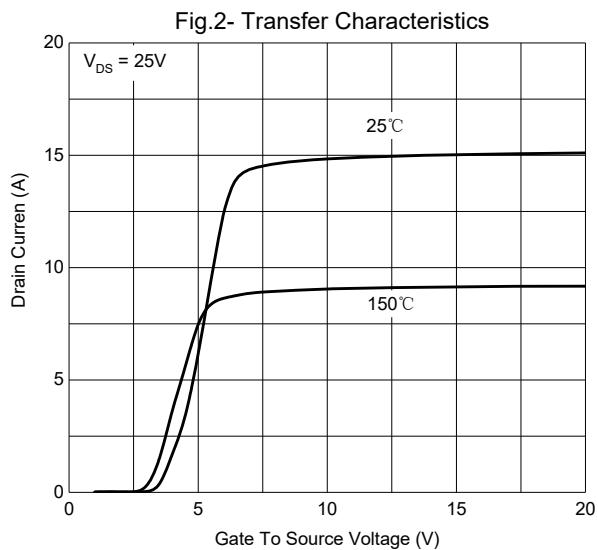
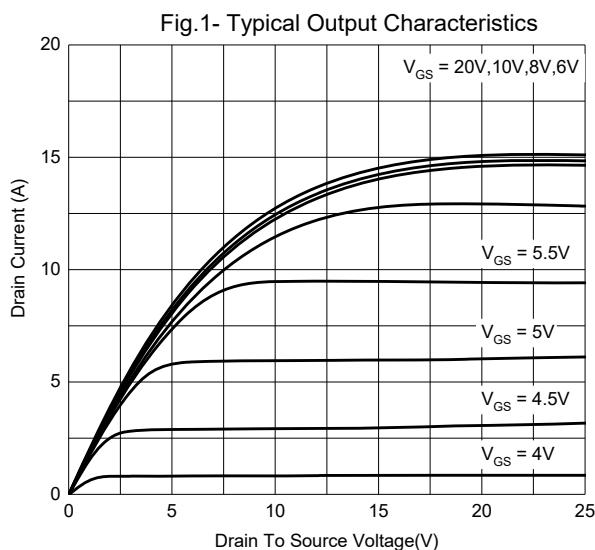


DIM	DIMENSIONS				NOTE
	INCHES	MM	MIN	MAX	
A	0.392	0.421	9.96	10.70	
B	0.138	3.50			Φ
C	0.106	2.70			TYP.
D	0.567	0.642	14.40	16.30	
E	0.520	13.20			TYP.
F	---	0.177	---	4.50	
G	0.100	2.54			TYP.
H	0.020	0.035	0.50	0.90	
J	0.043	0.053	1.10	1.35	
M	0.169	0.201	4.30	5.10	
N	---	0.140	---	3.56	
P	0.083	0.126	2.10	3.20	
Q	0.020	0.032	0.50	0.80	

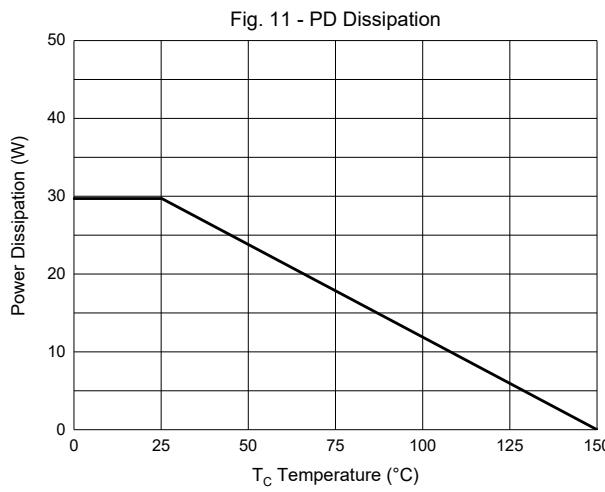
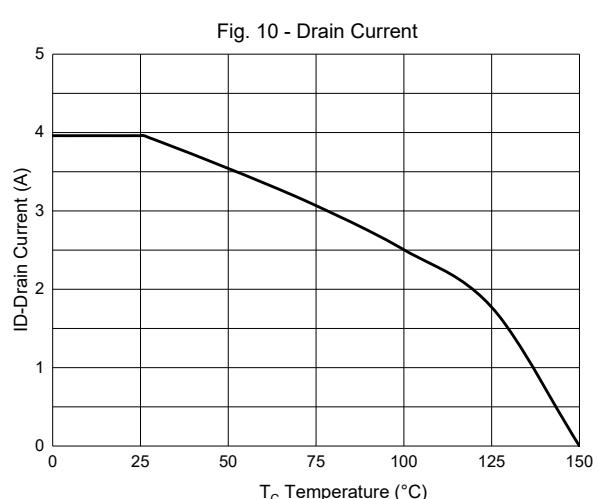
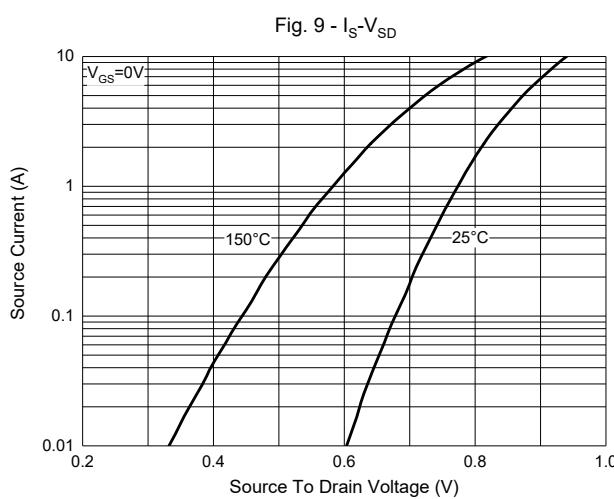
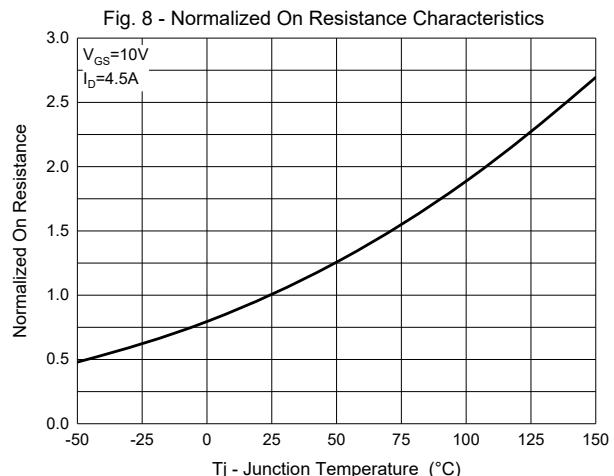
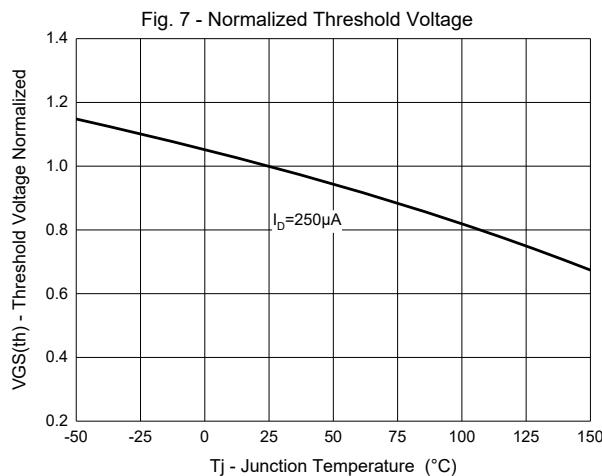
**Electrical Characteristics @ 25°C (Unless Otherwise Specified)**

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
<b>Static Characteristics</b>						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	635			V
Gate-Source Leakage Current	$I_{GSS}$	$V_{DS}=0V, V_{GS}=\pm 30V$			$\pm 100$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=650V, V_{GS}=0V$			1	$\mu A$
Gate-Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2	3	4	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=4.5A$		540	700	$m\Omega$
Gate Resistance	$R_G$	f=1MHz, Open Drain		100		$\Omega$
<b>Diode Characteristics</b>						
Continuous Body Diode Current	$I_S$				3.96	A
Diode Forward Voltage	$V_{SD}$	$V_{GS}=0V, I_S=4.5A$			1.2	V
Reverse Recovery Time	$t_{rr}$	$V_R=300V, I_F=4.5A$ $dI_F/dt=100A/\mu s$		135		ns
Reverse Recovery Charge	$Q_{rr}$			1024		nC
<b>Dynamic Characteristics</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=300V, V_{GS}=0V, f=1MHz$		347		pF
Output Capacitance	$C_{oss}$			10.3		
Reverse Transfer Capacitance	$C_{rss}$			2.3		
Total Gate Charge	$Q_g$	$V_{DS}=300V, V_{GS}=10V, I_D=4.5A$		9.3		nC
Gate-Source Charge	$Q_{gs}$			1.6		
Gate-Drain Charge	$Q_{gd}$			5.0		
Turn-On Delay Time	$t_{d(on)}$	$V_{DD}=300V, V_{GS}=10V$ $R_G=3\Omega, I_D=4.5A$		42		ns
Turn-On Rise Time	$t_r$			24		
Turn-Off Delay Time	$t_{d(off)}$			89		
Turn-Off Fall Time	$t_f$			27		

## Curve Characteristics



## Curve Characteristics



## Curve Characteristics

Fig. 12 - Safe Operation Area

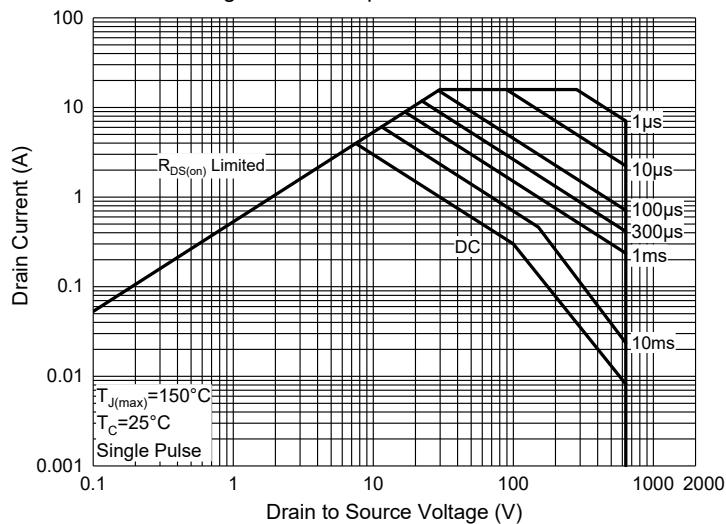
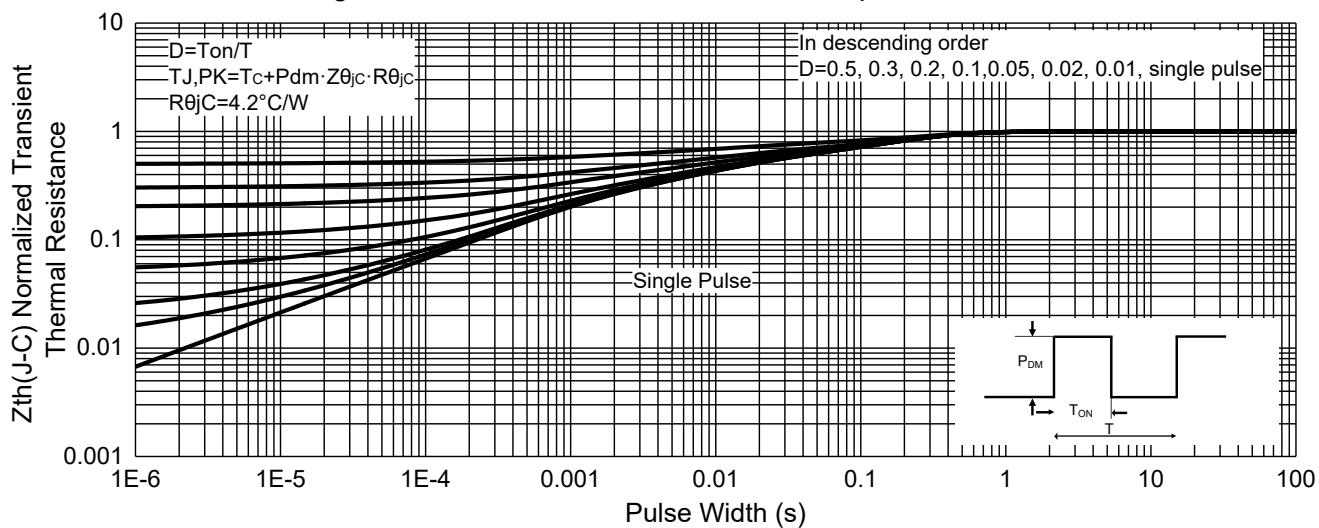


Fig. 13 - Normalized Transient Thermal Impedance



## Ordering Information

Device	Packing
Part Number-BP	Bulk: 50pcs/Tube; 1Kpcs/Box; 5Kpcs/Ctn

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