



Chipsmall Limited consists of a professional team with an average of over 10 year of expertise in the distribution of electronic components. Based in Hongkong, we have already established firm and mutual-benefit business relationships with customers from,Europe,America and south Asia,supplying obsolete and hard-to-find components to meet their specific needs.

With the principle of “Quality Parts,Customers Priority,Honest Operation,and Considerate Service”,our business mainly focus on the distribution of electronic components. Line cards we deal with include Microchip,ALPS,ROHM,Xilinx,Pulse,ON,Everlight and Freescale. Main products comprise IC,Modules,Potentiometer,IC Socket,Relay,Connector.Our parts cover such applications as commercial,industrial, and automotives areas.

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## N-Channel Power MOSFET

600V, 7A, 0.6Ω

### FEATURES

- Super-Junction technology
- High performance due to small figure-of-merit
- High ruggedness performance
- High commutation performance
- Pb-free plating
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21

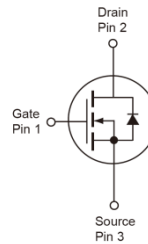
### APPLICATIONS

- Power Supply
- Lighting

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{DS}$	600	V
$R_{DS(on)}$ (max)	0.6	Ω
$Q_g$	13	nC



TO-252 (DPAK)



**Note:** MSL 3 (Moisture Sensitivity Level) per J-STD-020

ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-Source Voltage		$V_{DS}$	600	V
Gate-Source Voltage		$V_{GS}$	±30	V
Continuous Drain Current <sup>(Note 1)</sup>	$T_C = 25^\circ\text{C}$	$I_D$	7	A
	$T_C = 100^\circ\text{C}$		4.4	
Pulsed Drain Current <sup>(Note 2)</sup>		$I_{DM}$	21	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$		$P_{DTOT}$	63	W
Single Pulsed Avalanche Energy <sup>(Note 3)</sup>		$E_{AS}$	36	mJ
Single Pulsed Avalanche Current <sup>(Note 3)</sup>		$I_{AS}$	1.2	A
Operating Junction and Storage Temperature Range		$T_J, T_{STG}$	- 55 to +150	°C

THERMAL PERFORMANCE				
PARAMETER	SYMBOL	DPAK	IPAK	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	2		°C/W
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62		°C/W

**Thermal Performance Note:**  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances. The case-thermal reference is defined at the solder mounting surface of the drain pins.  $R_{\theta JA}$  is guaranteed by design while  $R_{\theta CA}$  is determined by the user's board design.  $R_{\theta JA}$  shown below for single device operation on FR-4 PCB in still air.

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	$BV_{DSS}$	600	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	2	3.4	4	V
Gate Body Leakage	$V_{GS} = \pm 30\text{V}, V_{DS} = 0\text{V}$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 600\text{V}, V_{GS} = 0\text{V}$	$I_{DSS}$	--	--	1	$\mu\text{A}$
Drain-Source On-State Resistance (Note 4)	$V_{GS} = 10\text{V}, I_D = 2.1\text{A}$	$R_{DS(on)}$	--	0.45	0.6	$\Omega$
<b>Dynamic</b> (Note 5)						
Total Gate Charge	$V_{DS} = 380\text{V}, I_D = 7\text{A},$ $V_{GS} = 10\text{V}$	$Q_g$	--	13	--	nC
Gate-Source Charge		$Q_{gs}$	--	3.36	--	
Gate-Drain Charge		$Q_{gd}$	--	5.56	--	
Input Capacitance	$V_{DS} = 100\text{V}, V_{GS} = 0\text{V},$ $f = 1.0\text{MHz}$	$C_{iss}$	--	516	--	pF
Output Capacitance		$C_{oss}$	--	55	--	
Gate Resistance	$F = 1\text{MHz}, \text{open drain}$	$R_g$	--	3.2	--	$\Omega$
<b>Switching</b> (Note 6)						
Turn-On Delay Time	$V_{DD} = 380\text{V},$ $R_{GEN} = 25\Omega,$ $I_D = 7\text{A}, V_{GS} = 10\text{V}$	$t_{d(on)}$	--	20.8	--	ns
Turn-On Rise Time		$t_r$	--	10	--	
Turn-Off Delay Time		$t_{d(off)}$	--	43	--	
Turn-Off Fall Time		$t_f$	--	8.4	--	
<b>Source-Drain Diode</b>						
Forward Voltage (Note 4)	$I_S = 7\text{A}, V_{GS} = 0\text{V}$	$V_{SD}$	--	--	1.4	V
Reverse Recovery Time	$V_R = 100\text{V}, I_S = 7\text{A}$ $di_F/dt = 100\text{A}/\mu\text{s}$	$t_{rr}$	--	232.5	--	ns
Reverse Recovery Charge		$Q_{rr}$	--	2.16	--	$\mu\text{C}$

**Notes:**

- Current limited by package.
- Pulse width limited by the maximum junction temperature.
- $L = 50\text{mH}, I_{AS} = 1.2\text{A}, V_{DD} = 50\text{V}, R_G = 25\Omega,$  Starting  $T_J = 25^\circ\text{C}$
- Pulse test:  $PW \leq 300\mu\text{s},$  duty cycle  $\leq 2\%$ .
- For DESIGN AID ONLY, not subject to production testing.
- Switching time is essentially independent of operating temperature.

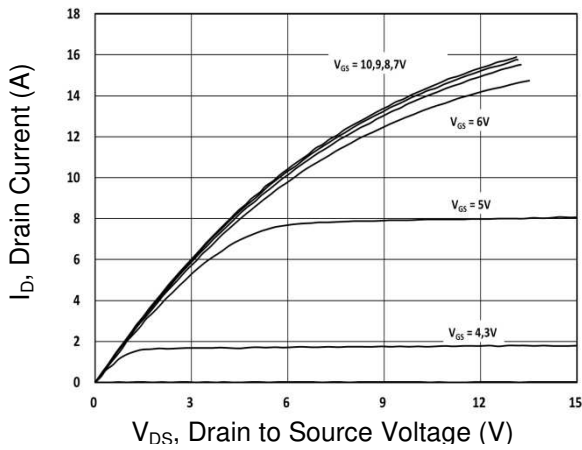
**ORDERING INFORMATION**

PART NO.	PACKAGE	PACKING
TSM60NB600CP ROG	TO-252 (DPAK)	2,500pcs / 13" Reel

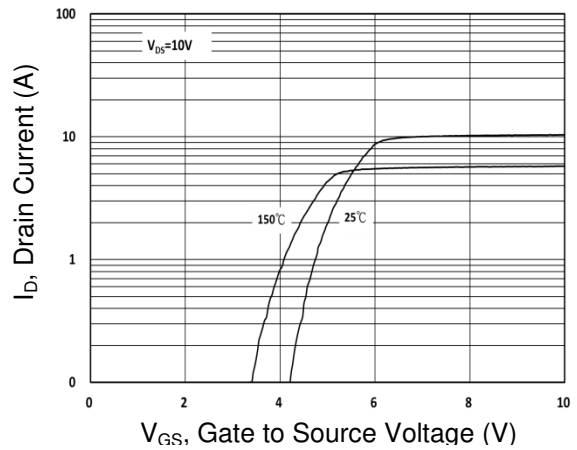
**CHARACTERISTICS CURVES**

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

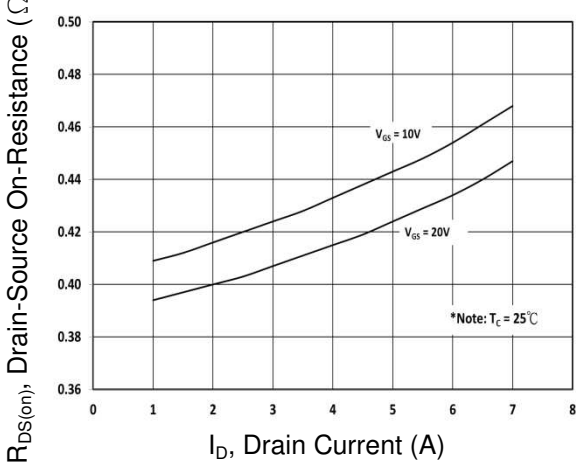
**Output Characteristics**



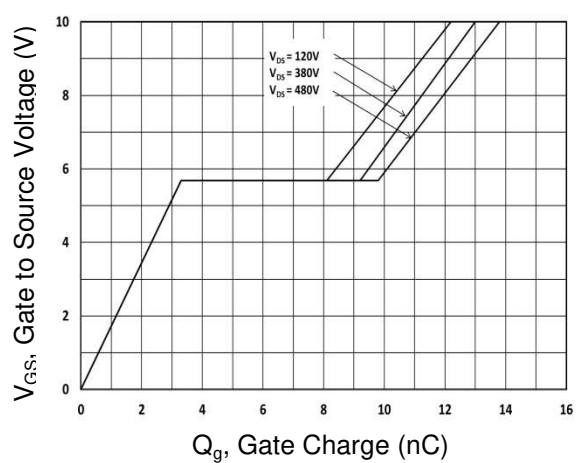
**Transfer Characteristics**



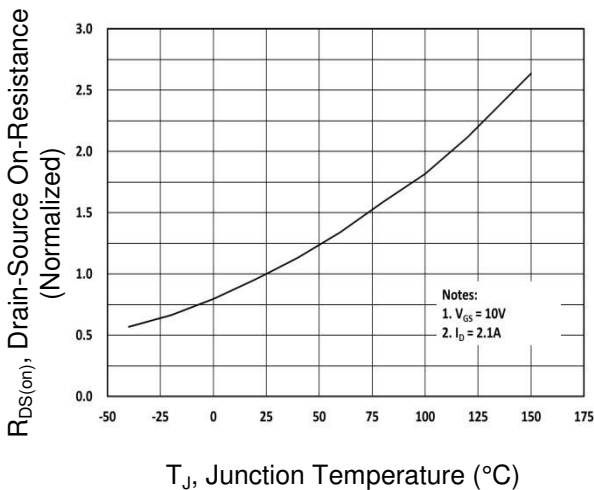
**On-Resistance vs. Drain Current**



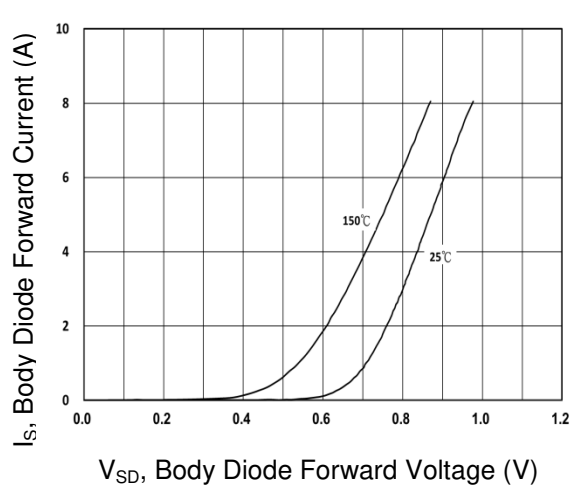
**Gate-Source Voltage vs. Gate Charge**



**On-Resistance vs. Junction Temperature**



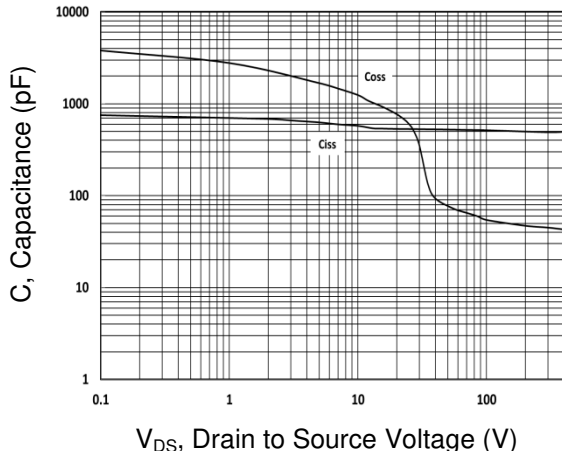
**Source-Drain Diode Forward Current vs. Voltage**



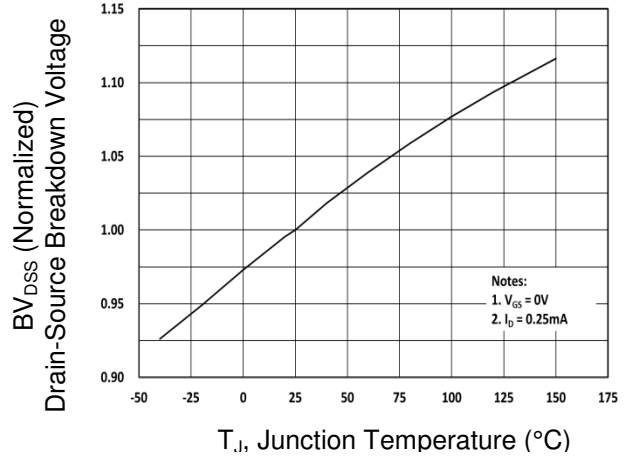
**CHARACTERISTICS CURVES**

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

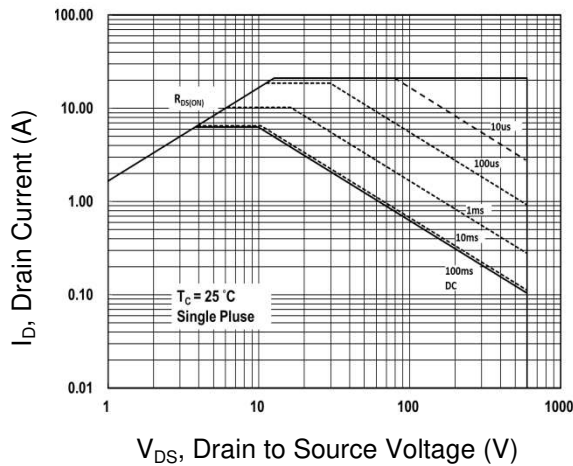
**Capacitance vs. Drain-Source Voltage**



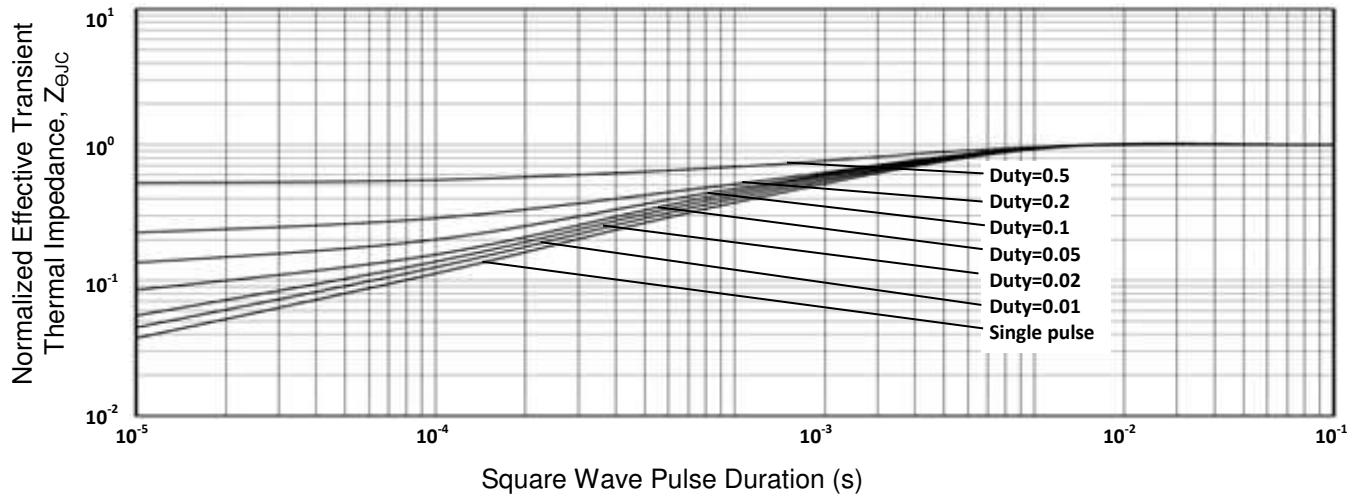
**$BV_{DSS}$  vs. Junction Temperature**



**Maximum Safe Operating Area**

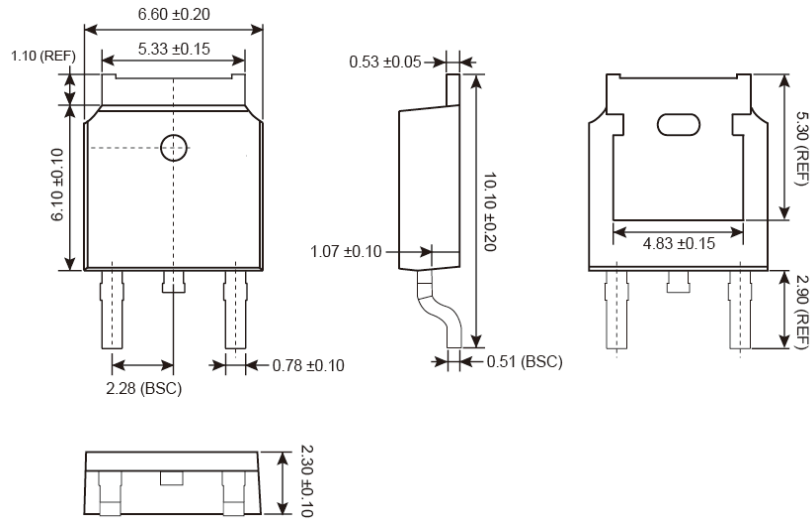


**Normalized Thermal Transient Impedance, Junction-to-Case**

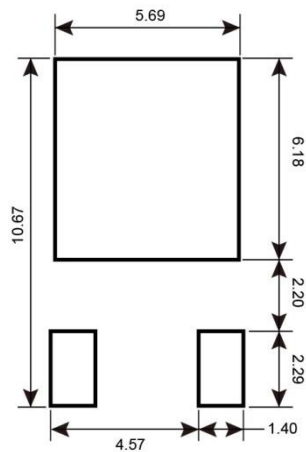


**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

**TO-252 (DPAK)**



**SUGGESTED PAD LAYOUT** (Unit: Millimeters)



**MARKING DIAGRAM**



- Y** = Year Code
- M** = Month Code for Halogen Free Product
  - O** =Jan    **P** =Feb    **Q** =Mar    **R** =Apr
  - S** =May    **T** =Jun    **U** =Jul    **V** =Aug
  - W** =Sep    **X** =Oct    **Y** =Nov    **Z** =Dec
- L** = Lot Code (1~9, A~Z)

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