

# GSMJF15N60

## 600V N-Channel MOSFETs

### Product Description

These N-Channel enhancement mode power field effect transistors are using advanced super junction technology. This advanced technology has been especially tailored to minimize on-state resistance, provide superior switching performance, and withstand high energy pulse in the avalanche and commutation mode.

These devices are well suited for high efficiency switch mode power supply.


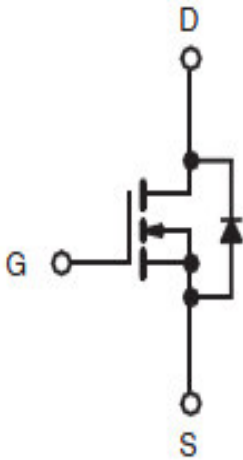
### Features

- 600V, 15A,  $R_{DS(ON)}=295m\Omega@V_{GS}=10V$
- Improved dv/dt capability
- Fast switching
- 100% EAS guaranteed
- Green Device Available
- TO-220F package design

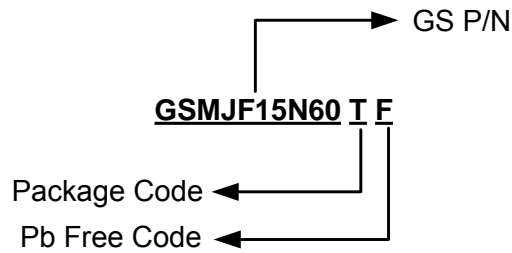
### Applications

- High efficient switched mode power supplies
- TV Power
- Adapter/charger
- Server Power
- PV Inverter / UPS

### Packages & Pin Assignments

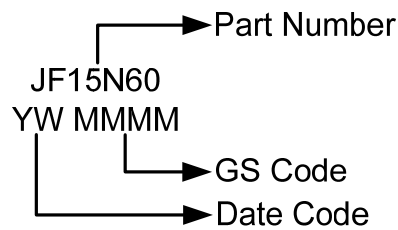
GSMJF15N60TF (TO-220F)	
 <p>Top View</p>	
	
Pin	Description
1	Gate
2	Drain
3	Source

## Ordering Information



Part Number	Package	Quantity Tube
GSMJF15N60TF	TO-220F	50 PCS

## Marking Information



## Absolute Maximum Ratings

$T_C=25^{\circ}\text{C}$  Unless otherwise noted

Symbol	Parameter	Typical	Unit
$V_{DS}$	Drain-Source Voltage	600	V
$V_{GS}$	Gate-Source Voltage	$\pm 30$	V
$I_D$	Continuous Drain Current	$T_C=25^{\circ}\text{C}$	15
		$T_C=100^{\circ}\text{C}$	9
$I_{DM}$	Pulsed Drain Current (Note 1)	60	A
EAS	Single Pulse Avalanche Energy (Note 2)	180	mJ
IAS	Single Pulse Avalanche Current (Note 2)	4	A
$P_D$	Power Dissipation ( $T_C=25^{\circ}\text{C}$ )	33	W
	Power Dissipation (Derate above $25^{\circ}\text{C}$ )	0.26	W/ $^{\circ}\text{C}$
$T_J$	Operating Junction Temperature Range	-55 to +150	$^{\circ}\text{C}$
$T_{STG}$	Storage Temperature Range	-55 to +150	$^{\circ}\text{C}$
$R_{\theta JA}$	Thermal Resistance-Junction to Ambient	62	$^{\circ}\text{C}/\text{W}$
$R_{\theta JC}$	Thermal Resistance-Junction to Case	3.8	$^{\circ}\text{C}/\text{W}$

Note 1: Repetitive Rating: Pulsed width limited by maximum junction temperature.

Note 2:  $V_{DD}=50\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=22.5\text{mH}$ ,  $I_{AS}=4\text{A}$ ,  $R_G=25\Omega$ , Starting  $T_J=25^{\circ}\text{C}$ .

## Electrical Characteristics

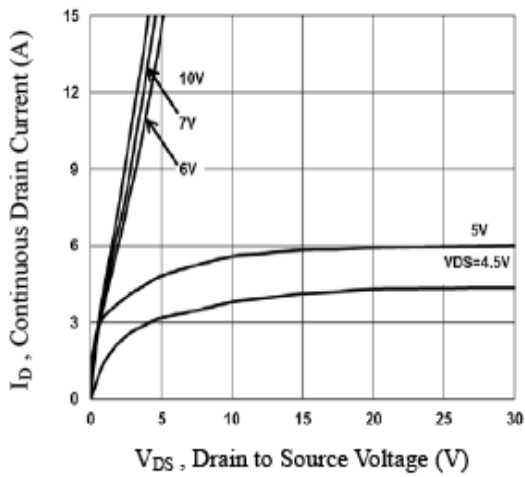
T<sub>J</sub>=25°C Unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
<b>Static</b>						
V <sub>(BR)DSS</sub>	Drain-Source Breakdown Voltage	V <sub>GS</sub> =0V, I <sub>D</sub> =250uA	600			V
ΔBV <sub>DSS</sub> /ΔT <sub>J</sub>	BV <sub>DSS</sub> Temperature Coefficient	Reference to 25°C, I <sub>D</sub> =1mA		0.6		V/°C
V <sub>GS(th)</sub>	Gate Threshold Voltage	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250uA	2	3.5	5	V
ΔV <sub>GS(th)</sub>	V <sub>GS(th)</sub> Temperature Coefficient			-6.3		mV/°C
I <sub>GSS</sub>	Gate Leakage Current	V <sub>DS</sub> =0V, V <sub>GS</sub> =±30V			±100	nA
I <sub>DSS</sub>	Zero Gate Voltage Drain Current	V <sub>DS</sub> =600V, V <sub>GS</sub> =0V			10	uA
		V <sub>DS</sub> =600V, V <sub>GS</sub> =0V, T <sub>J</sub> =125°C			100	
I <sub>S</sub>	Continuous Source Current	V <sub>G</sub> =V <sub>D</sub> =0V, Force Current			15	A
I <sub>SM</sub>	Pulsed Source Current				60	
R <sub>DS(on)</sub>	Drain-Source On-Resistance	V <sub>GS</sub> =10V, I <sub>D</sub> =10A		270	295	mΩ
V <sub>SD</sub>	Diode Forward Voltage	V <sub>GS</sub> =0V, I <sub>S</sub> =15A		0.9	1.3	V
t <sub>rr</sub>	Reverse Recovery Time (Note 3,4)	V <sub>GS</sub> =0V, I <sub>S</sub> =15A, di/dt=100A/us		315		nS
Q <sub>rr</sub>	Reverse Recovery Charge (Note 3,4)			3		uC
<b>Dynamic</b>						
Q <sub>g</sub>	Total Gate Charge (Note 3,4)	V <sub>DS</sub> =480V, V <sub>GS</sub> =10V, I <sub>D</sub> =10A		27		nC
Q <sub>gs</sub>	Gate-Source Charge (Note 3,4)			6.3		
Q <sub>gd</sub>	Gate-Drain Charge (Note 3,4)			14		
C <sub>iss</sub>	Input Capacitance	V <sub>DS</sub> =25V, V <sub>GS</sub> =0V, f=400KHz		950		pF
C <sub>oss</sub>	Output Capacitance			785		
C <sub>rss</sub>	Reverse Transfer Capacitance			11		
t <sub>d(on)</sub>	Turn-On Time (Note 3,4)	V <sub>DD</sub> =300V, I <sub>D</sub> =12A, V <sub>GS</sub> =10V, R <sub>G</sub> =4Ω		12		ns
t <sub>r</sub>				24		
t <sub>d(off)</sub>	Turn-Off Time (Note 3,4)			27		
t <sub>f</sub>				20		
R <sub>g</sub>	Gate Resistance		V <sub>GS</sub> =V <sub>DS</sub> =0V, f=1MHz		1.4	

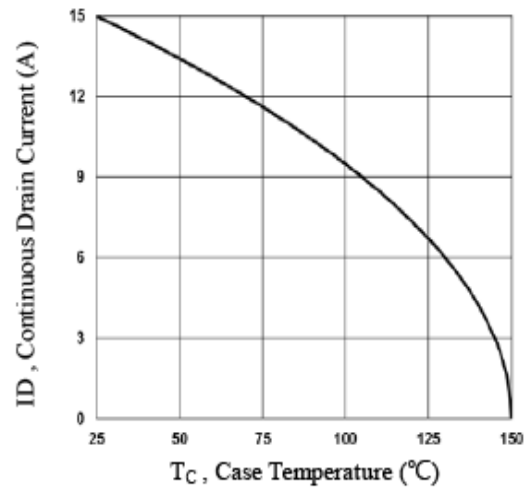
Note 3: The data tested by pulsed, pulse width ≤ 300us, duty cycle ≤ 2%.

Note 4: Essentially independent of operating temperature.

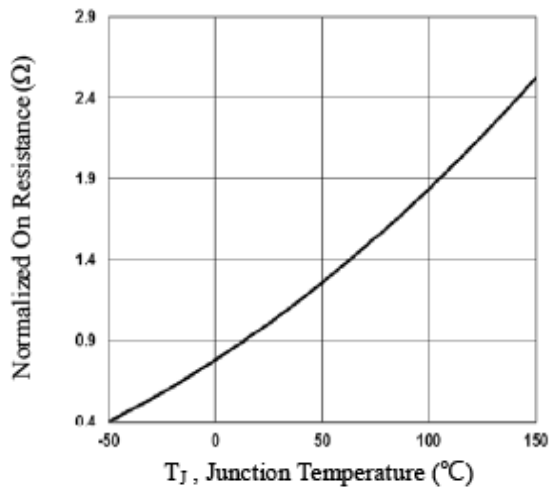
## Typical Performance Characteristics



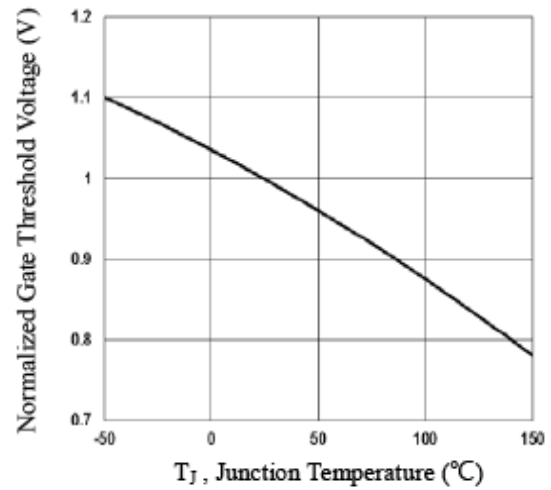
**Fig.1 Output Characteristics**



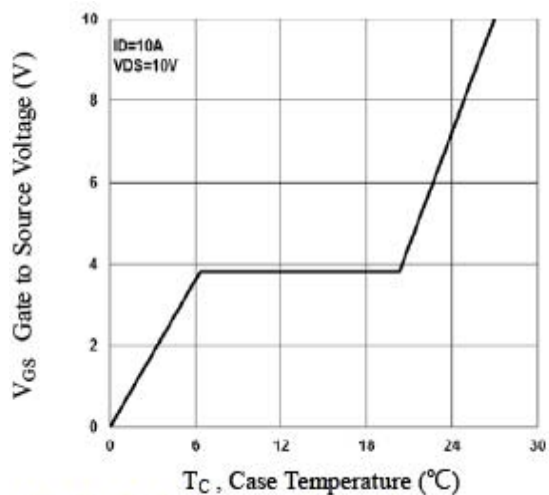
**Fig.2 Continuous Drain Current vs.  $T_C$**



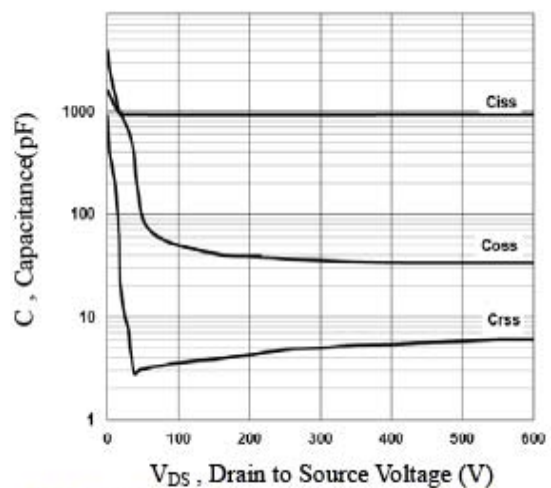
**Fig.3 Normalized  $R_{DS(on)}$  vs.  $T_J$**



**Fig.4 Normalized  $V_{th}$  vs.  $T_J$**

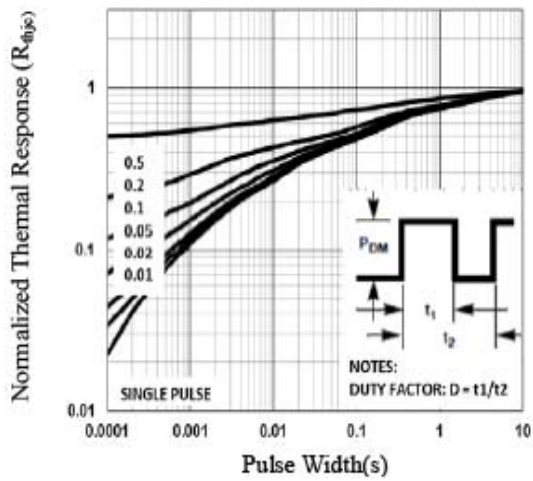


**Fig.5 Gate Charge Waveform**

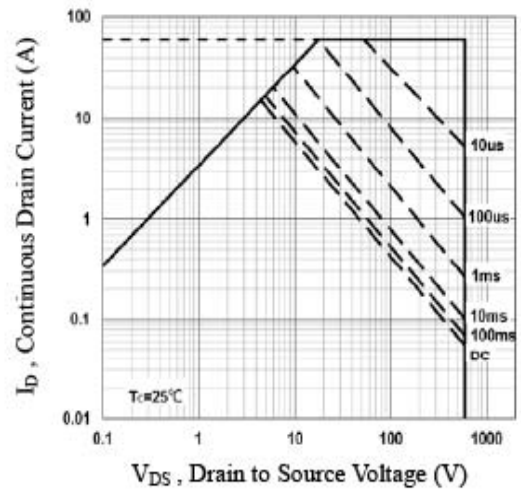


**Fig.6 Capacitance Characteristics**

## Typical Performance Characteristics (Continue)

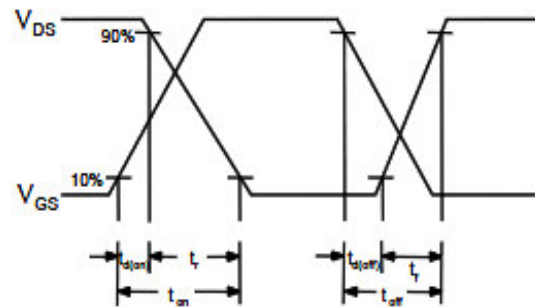
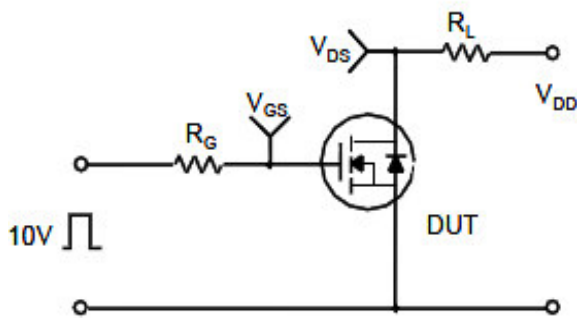


**Fig.7 Normalized Maximum Transient**

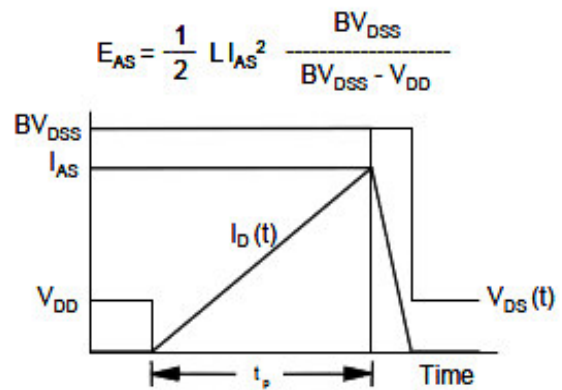
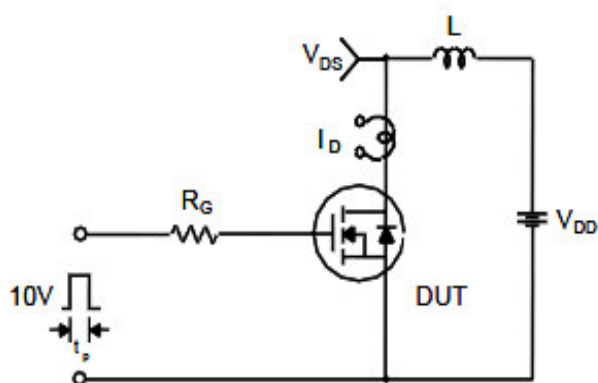


**Fig.8 Maximum Safe Operation Area**

### Resistive Switching Test Circuit & Waveforms

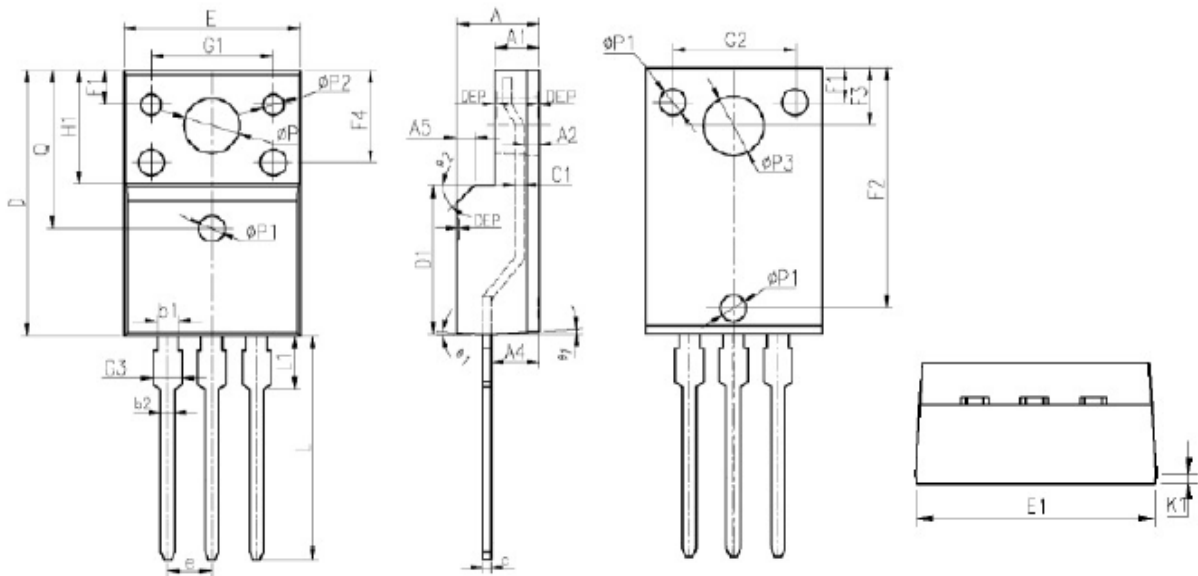


### Unclamped Inductive Switching Test Circuit & Waveforms



## Package Dimension

### TO-220F










Symbol	Dimension In Millimeters			Dimension In Inches		
	Min	Nom	Max	Min	Nom	Max
E	10.040	10.200	10.360	0.395	0.402	0.408
A	4.500	4.700	4.900	0.177	0.185	0.193
A1	2.340	2.540	2.740	0.092	0.100	0.108
A2	0.950	1.050	1.150	0.037	0.041	0.045
A4	2.650	2.750	2.850	0.104	0.108	0.112
A5	1.00REF			0.039REF		
c	0.420	0.500	0.580	0.017	0.020	0.023
c1	0.420	0.500	0.580	0.017	0.020	0.023
D	15.670	15.870	16.070	0.617	0.625	0.633
Q	9.20REF			0.362REF		
H1	6.70REF			0.264REF		
e	2.54BSC			0.10BSC		
$\phi P$	3.183REF			0.125REF		
L	12.780	12.980	13.180	0.503	0.511	0.519
L1	3.250	3.450	3.650	0.128	0.136	0.144
D1	9.17REF			0.362REF		
$\phi P1$	1.400	1.500	1.600	0.055	0.059	0.063
$\phi P2$	1.150	1.200	1.250	0.045	0.047	0.049
$\phi P3$	3.45REF			0.136REF		
$\theta 1$	5°	7°	9°	5°	7°	9°
$\theta 2$	-	45°	-	-	45°	-
DEP	0.050	0.100	0.150	0.002	0.004	0.006
F1	1.900	2.000	2.100	0.075	0.079	0.083
F2	13.800	13.900	14.000	0.543	0.547	0.551
F3	3.200	3.300	3.400	0.126	0.130	0.134
F4	5.300	5.400	5.500	0.209	0.213	0.217
G1	6.600	6.700	6.800	0.260	0.264	0.268
G2	6.900	7.000	7.100	0.272	0.276	0.280
G3	1.100	1.300	1.500	0.043	0.051	0.059
E1	9.900	10.000	10.100	0.390	0.394	0.398
K1	0.850	0.700	0.750	0.028	0.028	0.030
b1	1.050	1.200	1.350	0.041	0.047	0.053
b2	0.700	0.800	0.850	0.028	0.031	0.033



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