

## 60V N-Channel Mosfet

### FEATURES

- $R_{DS(ON)}=3.2m\Omega(Typ.) @V_{GS}=10V$
- $R_{DS(ON)}=3.7m\Omega(Typ.) @V_{GS}=4.5V$

### APPLICATIONS

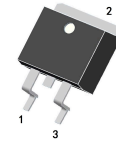
- Consumer electronic power supply
- Motor control
- Synchronous-rectification
- Isolated DC/DC convertor
- Invertors

### TO-220C/TO-263



TO-220C

JST130N60T0

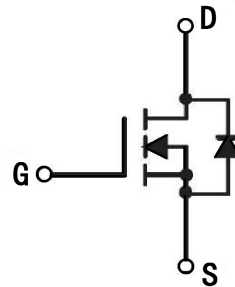


TO-263

JST130N60T3

- 1.Gate
- 2.Drain
- 3.Source

### N-CHANNEL MOSFET



### MAXIMUM RATINGS ( $T_C=25^\circ C$ unless otherwise noted)

Symbol	Parameter		Limit	Units
$V_{DSS}$	Drain-Source Voltage		60	V
$V_{GSS}$	Gate-Source Voltage		$\pm 20$	V
$I_D$	Continuous Drain Current <small>note1</small>	$T_C = 25^\circ C$	135	A
		$T_C = 100^\circ C$	90	A
$I_{DM}$	Pulsed Drain Current <small>note2</small>		450	A
$E_{AS}$	Single Pulsed Avalanche Energy <small>note3</small>		400	mJ
$P_D$	Power Dissipation <small>note4</small>	$T_C = 25^\circ C$	104	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case		1.2	$^\circ C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient <small>note5</small>		62	$^\circ C/W$
$T_J, T_{STG}$	Operating and Storage Temperature Range		-55 to +150	$^\circ C$

**MOSFET ELECTRICAL CHARACTERISTICS  $T_C=25\text{ }^\circ\text{C}$  unless otherwise specified**

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
<b>Off Characteristic</b>						
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	60	-	-	V
$I_{DSS}$	Zero Gate Voltage Drain Current	$V_{DS} = 48V, V_{GS} = 0V$ $T_J = 25^\circ C$	-	-	1	$\mu A$
$I_{GSS}$	Gate to Body Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	$\pm 100$	nA
<b>On Characteristics</b>						
$V_{GS(th)}$	Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	-	3.0	V
$R_{DS(on)}$	Gate Drain-Source On-State Resistance	$V_{GS}=10V, I_D=20A$	-	3.2	3.7	m $\Omega$
		$V_{GS}=4.5V, I_D=15A$	-	3.7	4.7	
<b>Dynamic Characteristics</b>						
$C_{iss}$	Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0MHz$	-	4894	-	pF
$C_{oss}$	Output Capacitance		-	2208	-	pF
$C_{rss}$	Reverse Transfer Capacitance		-	171	-	pF
$Q_g$	Total Gate Charge	$V_{DS}=30V, I_D=25A,$ $V_{GS}=10V$	-	87.2	-	nC
$Q_{gs}$	Gate-Source Charge		-	10.7	-	nC
$Q_{gd}$	Gate-Drain("Miller") Charge		-	10.9	-	nC
<b>Switching Characteristics</b>						
$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 10V, V_{DS}=30V,$ $R_G = 2\Omega, I_D=25A$	-	22.5	-	ns
$t_r$	Turn-On Rise Time		-	33	-	ns
$t_{d(off)}$	Turn-Off Delay Time		-	80.3	-	ns
$t_f$	Turn-Off Fall Time		-	26.8	-	ns
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
$I_S$	Maximum Continuous Drain to Source Diode Forward Current		-	-	135	A
$I_{SM}$	Maximum Pulsed Drain to Source Diode Forward Current		-	-	450	A
$V_{SD}$	Drain to Source Diode Forward Voltage	$V_{GS} = 0V, I_{SD}=20A,$ $T_J = 25^\circ C$	-	-	1.3	V
$t_{rr}$	Reverse Recovery Time	$V_{GS} = 0V, I_S = 25A,$ $di/dt = 100A/\mu s$	-	70	-	ns
$Q_{rr}$	Reverse Recovery Charge		-	73	-	nC

- Notes: 1. Calculated continuous current based on maximum allowable junction temperature.  
2. Repetitive rating; pulse width limited by max. junction temperature.  
3.  $V_{DD}=30V, R_G=25\Omega, L=0.5mH$ , starting  $T_J=25^\circ C$ .  
4.  $P_d$  is based on max. junction temperature, using junction-case thermal resistance.  
5. The value of  $R_{\theta JA}$  is measured with the device mounted on 1 in 2 FR-4 board with 2oz.Copper, in a still air environment with  $T_J=25^\circ C$ .

Typical Performance Characteristics

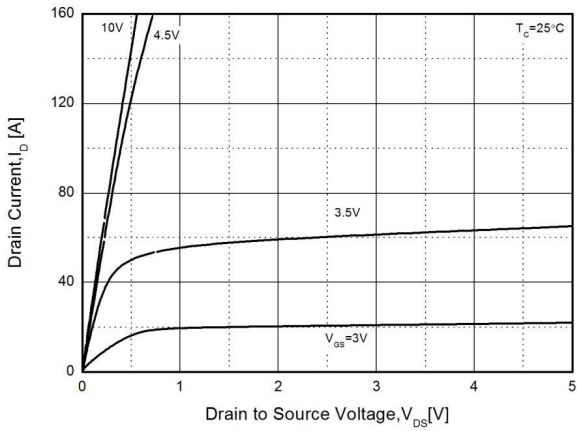


Figure1. Output Characteristics

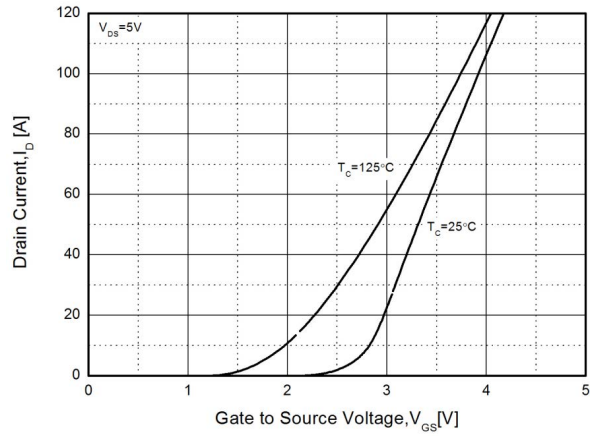


Figure2. Transfer Characteristics

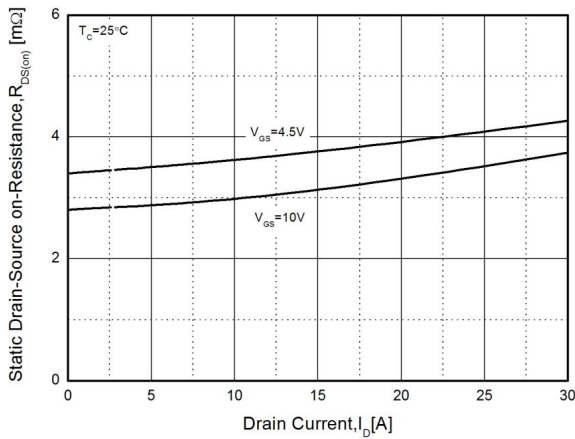


Figure3. Rdson-Drain Current

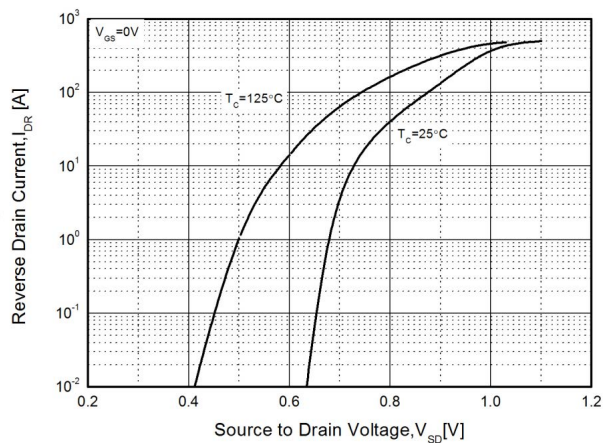


Figure4. Typical Source-Drain Diode Forward Voltage

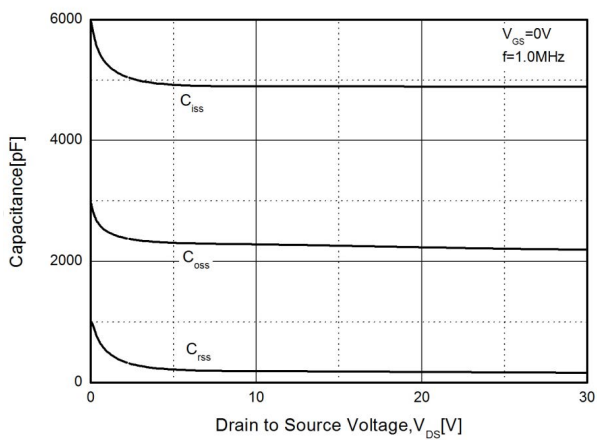


Figure5. Capacitance Characteristics

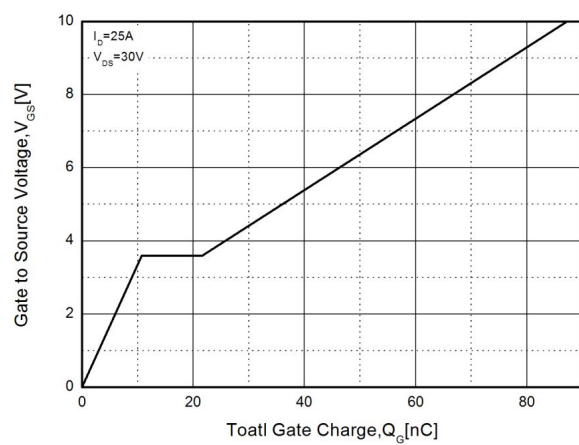


Figure6. Gate Charge

Typical Performance Characteristics (cont.)

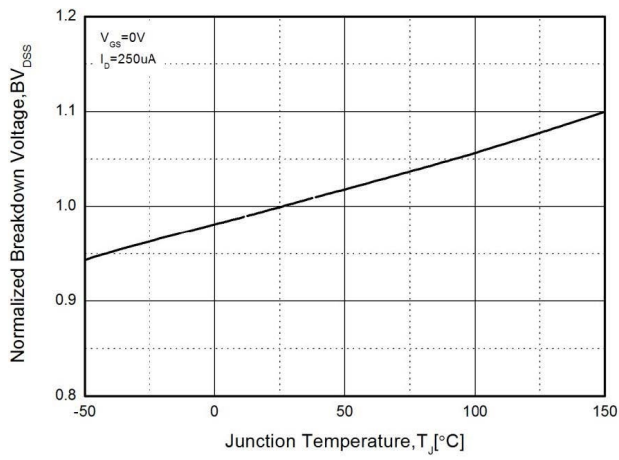


Figure7. Normalized Breakdown Voltage vs. Temperature

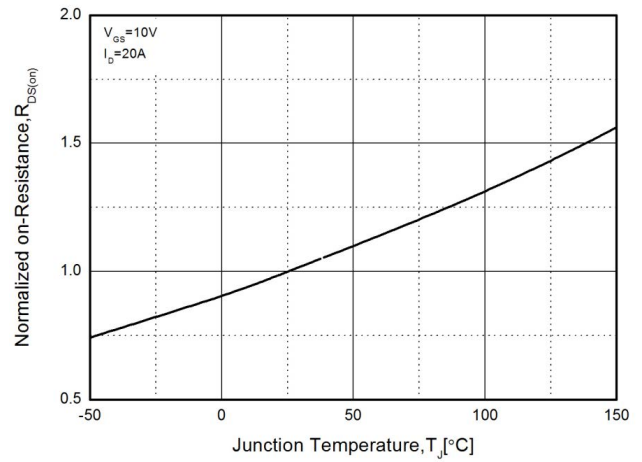


Figure8. Normalized on-Resistance vs. Temperature

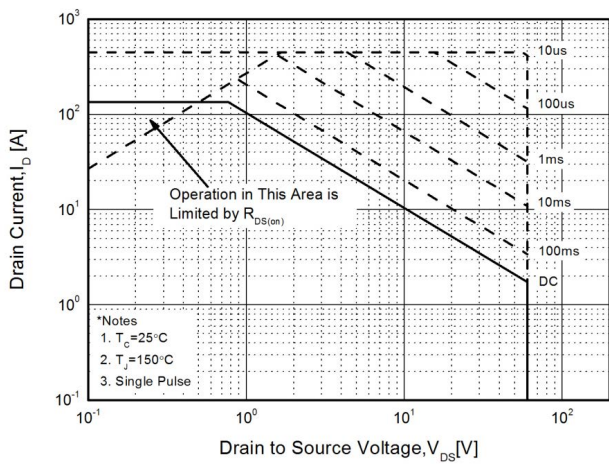


Figure9. Safe Operation Area

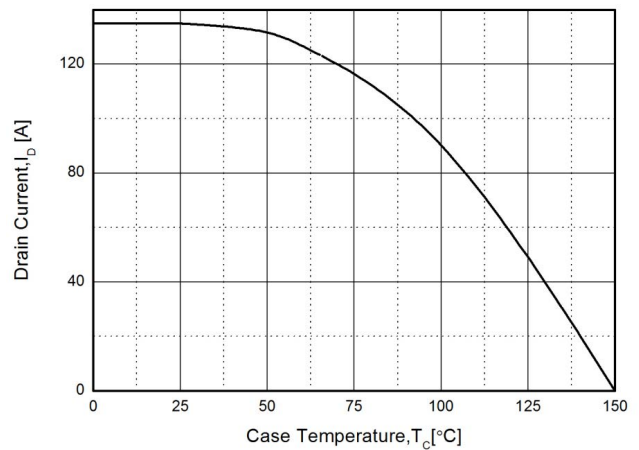


Figure10. Drain Current vs. Case Temperature

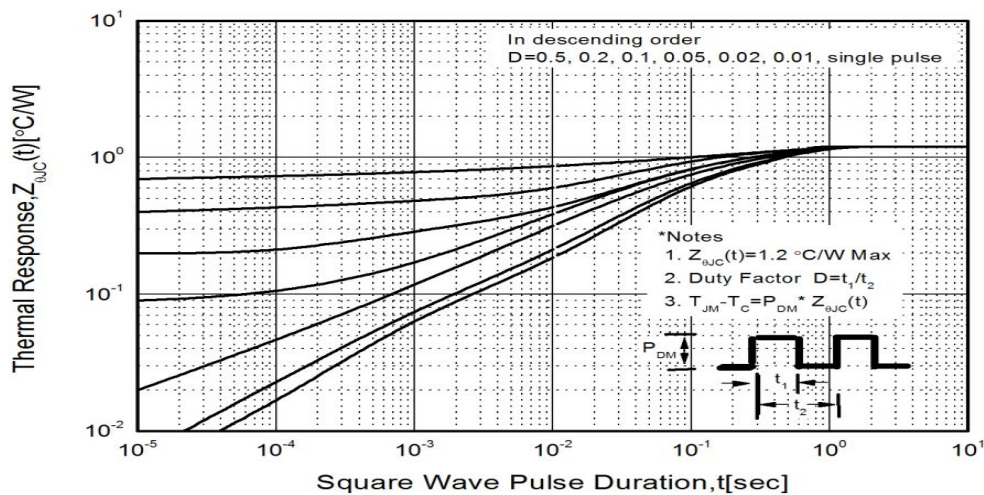
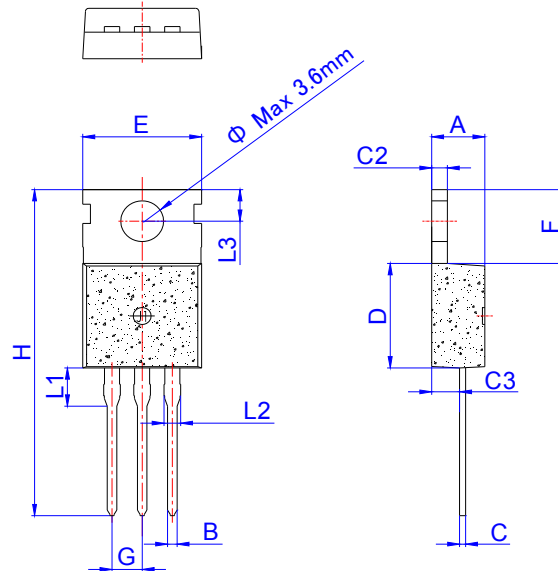


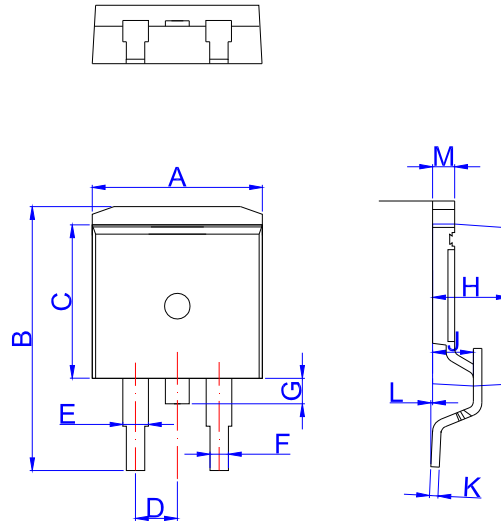
Figure11. Transient Thermal Response Curve

## TO-220C PACKAGE OUTLINE DRAWING



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	4.40		4.60	0.173		1.181
B	0.70		0.90	0.027		0.035
C	0.45		0.60	0.018		0.024
C2	1.23		1.32	0.048		0.052
C3	2.20		2.60	0.086		0.102
D	8.90		9.90	0.350		0.390
E	9.90		10.3	0.390		0.406
F	6.30		6.90	0.248		0.272
G		2.54			0.1	
H	28.0		29.8	11.0		11.7
L1		3.39			0.133	
L2	1.14		1.70	0.045		0.067
L3	2.65		2.95	0.104		0.116
$\Phi$		3.6			0.142	

## TO-263 PACKAGE OUTLINE DRAWING



Ref.	Dimensions					
	Millimeters			Inches		
	Min.	Typ.	Max.	Min.	Typ.	Max.
A	9.90		10.20	0.390		0.402
B	14.70		15.80	0.579		0.622
C	9.4		9.6	0.37		0.378
D		2.54			0.100	
E	1.20		1.40	0.047		0.055
F	0.75		0.85	0.029		0.033
G			1.75			0.069
H	4.40		4.70	0.173		0.185
J	2.30		2.70	0.091		0.106
K	0.38		0.55	0.015		0.022
L	0	0.10	0.25	0	0.004	0.010
M	1.25		1.35	0.049		0.053