

Promising Chip YZPST-STW20NM60

N-channel Enhanced mode TO-247 MOSFET

Features

- High ruggedness
- Low $R_{DS(ON)}$ (Typ 0.22 Ω)@ $V_{GS}=10V$
- Low Gate Charge (Typ 84nC)
- Improved dv/dt Capability
- 100% Avalanche Tested
- Application: UPS, Charge, PC Power, Inverter



BV_{DSS}: 600V I_D: 20A $R_{DS(ON)}$: 0.22 Ω
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General Description

This power MOSFET is produced with advanced technology of Promising Chip.

This technology enable the power MOSFET to have better characteristics, including fast switching time, low on resistance, low gate charge and especially excellent avalanche characteristics.

Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DSS}	Drain to source voltage	600	V
I_D	Continuous drain current (@ $T_c=25^\circ C$)	20*	A
	Continuous drain current (@ $T_c=100^\circ C$)	12*	A
I_{DM}	Drain current pulsed	78	A
V_{GS}	Gate to source voltage	± 30	V
E_{AS}	Single pulsed avalanche energy	1284	mJ
E_{AR}	Repetitive pulsed avalanche energy	97	mJ
dv/dt	Peak diode recovery dv/dt	5	V/ns
P_D	Total power dissipation (@ $T_c=25^\circ C$)	42.3	W
	Derating factor above 25 $^\circ C$	0.32	W/ $^\circ C$
T_{STG}, T_J	Operating junction temperature & storage temperature	-55~+150	$^\circ C$
T_L	Maximum lead temperature for soldering purpose, 1/8 from case for 5second	300	$^\circ C$

*Drain current is limited by junction temperature

Thermal characteristics:

Symbol	Parameter	Value	Unit
R_{thjc}	Thermal resistance, Junction to case	3.1	$^\circ C/W$
R_{thja}	Thermal resistance, Junction to ambient	49	$^\circ C/W$

Source to drain diode ratings characteristics:

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_S	Continuous source current	Integral reverse p-n Junction diode in the MOSFET			20	A
I_{SM}	Pulsed source current				80	A



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V_{SD}	Diode forward voltage drop	$I_S = 20A$ $V_{GS} = 0V$			1.3	V
t_{rr}	Reverse recovery time	$I_S = 20A$ $V_{GS} = 0V$		494		ns
Q_{rr}	Reverse recovery charge	$di/dt = 100A/us$		7.3		μC



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Electrical characteristics(Tc=25°C unless otherwise specified):

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
Off characteristics						
BV_{DSS}	Drain to source breakdown voltage	$V_{GS}=0V$ $I_D=250\mu A$	600			V
$\frac{\Delta BV_{DSS}}{\Delta T_J}$	Breakdown voltage temperature coefficient	$I_D=250\mu A$ referenced to 25°C		0.52		V/°C
I_{DSS}	Drain to source leakage current	$V_{DS}=500V$ $V_{GS}=0V$			1	μA
		$V_{DS}=400V$ $T_C=125^\circ C$			50	μA
I_{GSS}	Gate to source leakage current, forward	$V_{GS}=30V$ $V_{DS}=0V$			100	nA
	Gate to source leakage current, reverse	$V_{GS}=-30V$ $V_{DS}=0V$			-100	nA
On characteristics						
$V_{GS(TH)}$	Gate threshold voltage	$V_{DS}=V_{GS}$ $I_D=250\mu A$	2.5		4.5	V
$R_{DS(ON)}$	Drain to source on state resistance	$V_{GS}=10V$ $I_D=10A$		0.22	0.28	Ω
G_{fs}	Forward transconductance	$V_{DS}=30V$ $I_D=10A$		18		S
Dynamic characteristics						
C_{iss}	Input capacitance	$V_{GS}=0V$ $V_{DS}=25V$ $f=1MHz$		4498		pF
C_{oss}	Output capacitance			362		
C_{rss}	Reverse transfer capacitance			12		
$t_{d(on)}$	Turn on delay time	$V_{DS}=250V$ $I_D=20A$ $R_G=25\Omega$ $V_{GS}=10V$		72		ns
t_r	Rising time			89		
$t_{d(off)}$	Turn off delay time			155		
t_f	Fall time			71		
Q_g	Total gate charge	$V_{DS}=400V$ $V_{GS}=10V$ $I_D=20A$		84		nC
Q_{gs}	Gate-source charge			30		
Q_{gd}	Gate-drain charge			32		

Fig.1 On-state characteristics

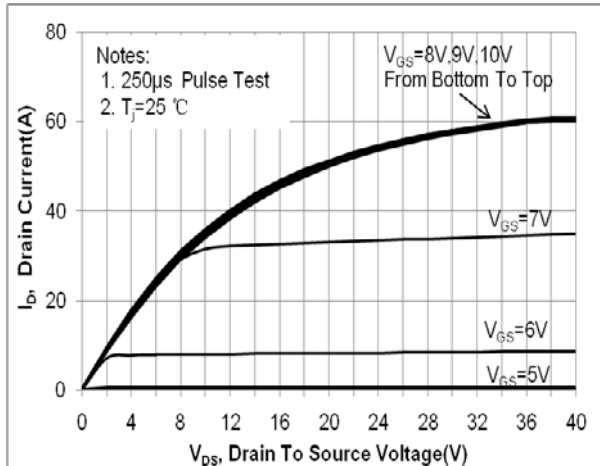


Fig.2 On-resistance variation vs drain current and gate voltage

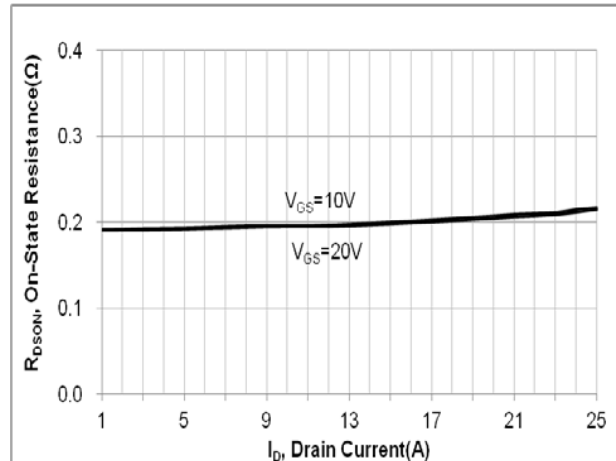


Fig.3 Gate charge characteristics

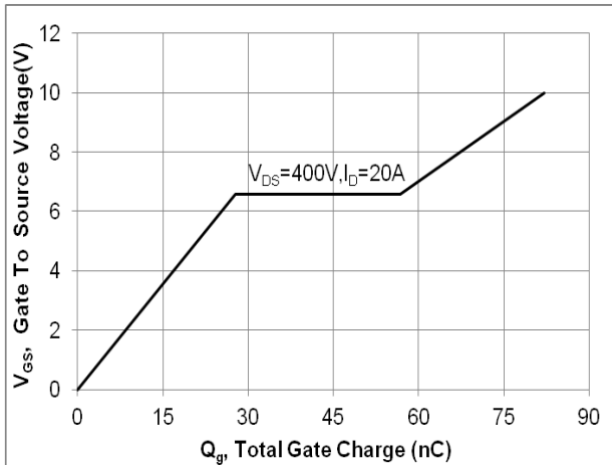


Fig.4 On state current vs diode forward voltage

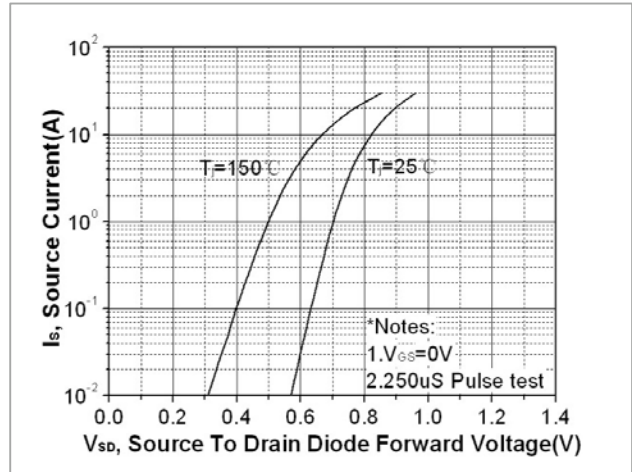


Fig.5 Breakdown Voltage Variation vs Junction temperature

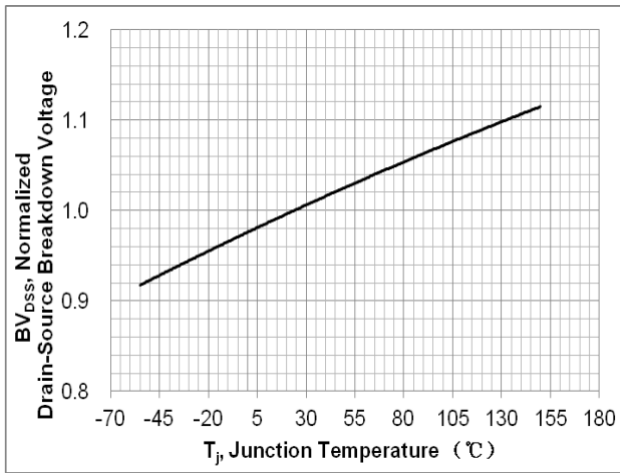


Fig.6 On-resistance variation vs junction temperature

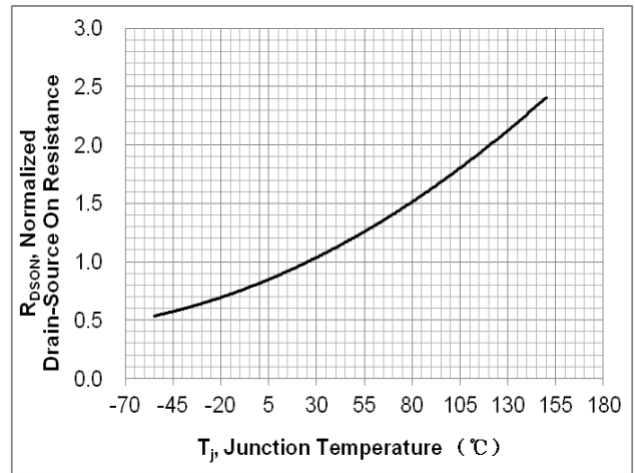


Fig.7 Maximum safe operation area

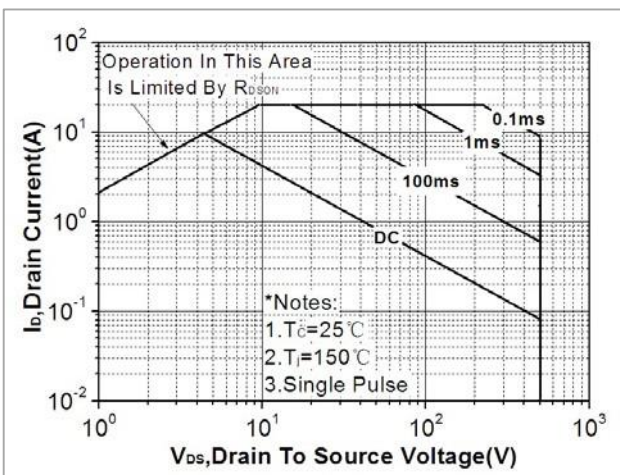


Fig.8 Capacitance Characteristics

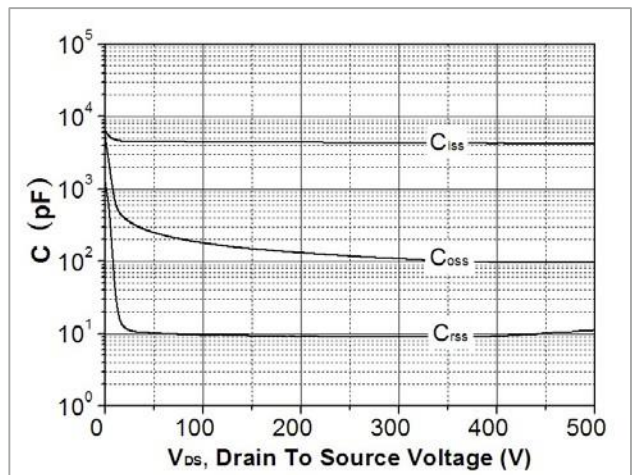


Fig.9 Gate charge test circuit & waveform

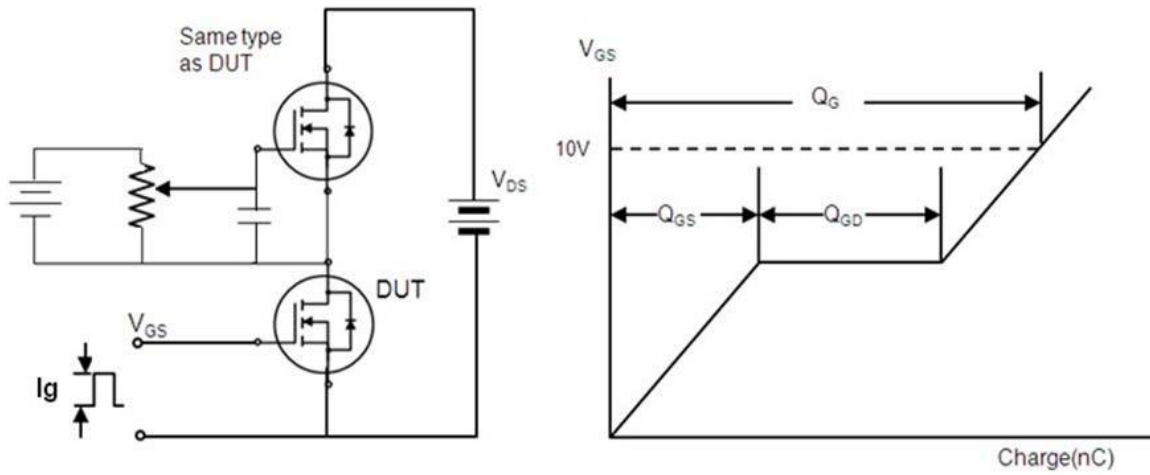
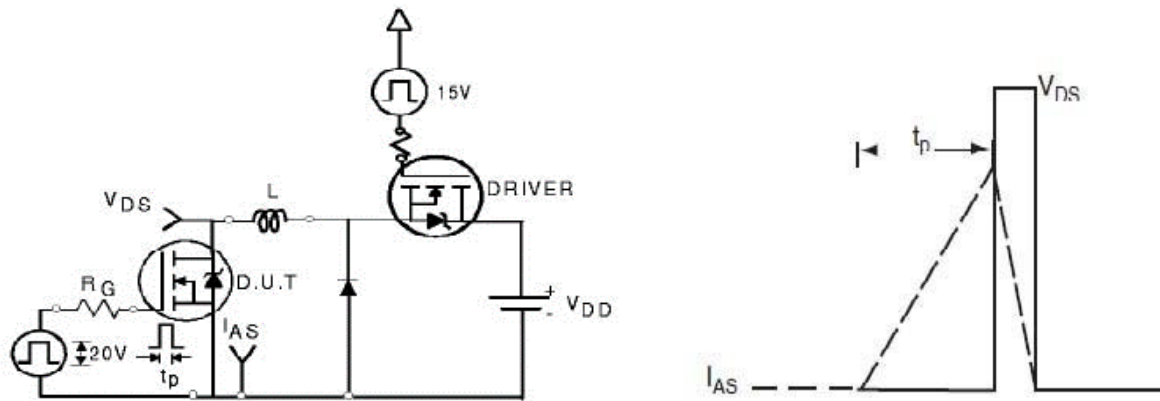
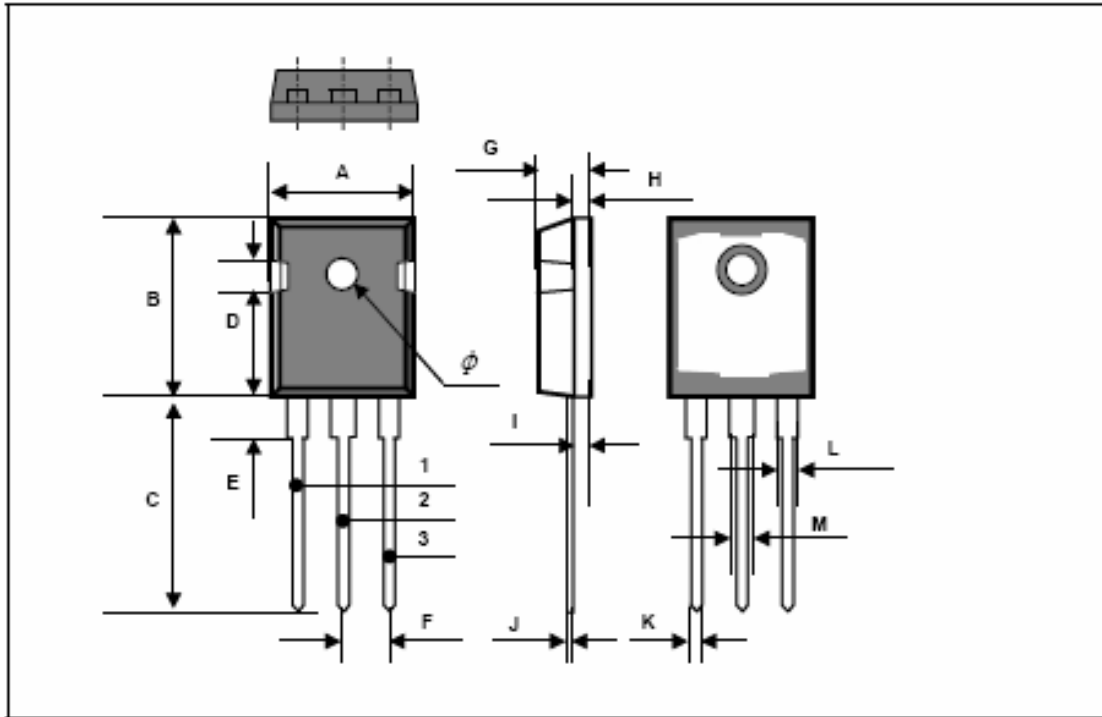


Fig.10 Unclamp Inductive switching test circuit & waveform



Drawing Name
TO-247-3L (LL)



SYMBOL	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.621	0.631	15.77	16.03
B	0.819	0.845	20.80	21.46
C	0.781	0.792	19.85	20.11
D	0.172	0.182	4.37	4.63
E	0.160	0.170	4.07	4.33
F	0.209	0.220	5.32	5.58
G	0.193	0.200	4.90	5.10
H	0.076	0.082	1.92	2.08
I	0.090	0.094	2.30	2.40
J	0.024 BSC.		0.6 BSC.	
K	0.045	0.049	1.15	1.25
L	0.077	0.081	1.95	2.05
M	0.112	0.122	2.85	3.11
ϕ	0.140	0.144	3.56	3.66