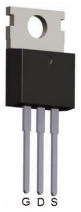
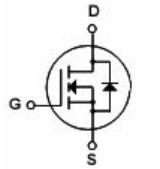
TS4N60

600V N-Channel Mosfet

DRAWING





features

- 4.0A,600V,R_{DSON}=2.5Ω@V_{GS}=10V
- Low gate charge(typical 22nc)
- Low Crss (typical 14pF)
- Fast switching
- 100%avalanche tested
- Improved dv/dt capability

General Description

- Package:ITO-220AB
- 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.

Absolute Maximum Ratings

Symbol	Parameter	Spec	Units
V_{DSS}	Drain-Source Voltage	600	V
I_D	Drain Current -Continuous(Tc=25℃)	4	A
	-Continuous(Tc=100℃)	2.5	A
I_{DM}	Drain Current -Pulsed (Note 1)	16	A
V_{GSS}	Gate-Source Voltage	±30	V
E_{AS}	Single Pulsed Avalanche Energy (Note 2)	240	mJ
I_{AR}	Avalanche Current (Note 1)	4	A
E_{AR}	Repetitive Avalanche Energy (Note 1)	10	mJ
dv/dt	Peak Diode Recovery dv/dt (Note 3)	5.5	V/ns
P_D	Power Dissipation (TC=25℃)	100	W
	-Derate above 25℃	0.26	W/℃
Tj,T_{STG}	Operating and Storage Temperature Range	-55 to +150	℃
T_L	Maximum lead temperature for soldering purpose 1/8" from case for 5 seconds	300	℃

Thermal Characteristics

Symbol	Parameter	Typ	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction-to-Case	_	1.25	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	_	0.5	℃/W
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	_	62.5	℃/W

Electrical Characteristics(Tc=25℃ unless otherwise noted)

Off Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V,I_D=250uA	600	_	_	V
BV_{DSS}/T_J	Breakdown Voltage Temperature Coefficient	ID=250uA,Referenced to 25℃	_	0.65	_	V/℃
I_{DSS}	Zero Gate Voltage Drain Current	V_{DS}=600V,V_{GS}=0V	_	_	1	uA
		V_{DS}=480V,Tc=125℃	_	_	100	uA
I_{GSSF}	Gate-Body Leakage Current,Forward	Vgs=30V,Vds=0V	_	_	100	nA
I_{GSSR}	Gate-Body Leakage Current,Reverse	Vgs=-30V,Vds=0V	_	_	-100	nA

On Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
V_{GSTH}	Gate Threshold Voltage	VDS=VGS,ID=250uA	2	_	5	V
R_{DSON}	Static Drain-Source On-Resistance	VGS=10V,ID=2.2A	_	2.0	2.5	Ω
G_{fs}	Forward Transconductance	VDS=40V， ID=2.0A (Note 4)	_	4.7	_	S

Dynamic Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Cjss	Input Capacitance	VDS=25V,VGS=0V,f=1.0MHz	_	710	920	pF
Coss	Output Capacitance		_	65	85	pF
Crss	Reverse Transfer Capacitance		_	14	19	pF

Switching Characteristics

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
t_{don}	Turn-On Delay Time	V_{DD}=300V I_D=4.0A R_G=25Ω (Note 4 .5)	_	20	50	ns
t_r	Turn-On Rise Time		_	55	120	ns
t_{doff}	Turn-Off Delay Time		_	70	150	ns
t_f	Turn-Off Fall Time		_	55	120	ns
Q_g	Total Gate Charge	V_{DS}=480V I_D=4.0A V_{GS}=10V (Note 4 .5)	_	22	29	nc
Q_{gs}	Gate-Source Charge		_	4.8	_	nc
Q_{gd}	Gate-Drain Charge		_	8.5	_	nc

Drain-Source Diode Characteristics and Maximum Ratings

Symbol	Parameter	Test Conditions	Min	Typ	Max	Units
Is	Maximum Continuous Drain-source diode forward current		_	_	4	A
Ism	Maximum pulsed drain-source diode diode forward current		_	_	16	A
Vsd	Drain-source diode forward Voltage	VGS=0V,IS=5.0A	_	_	1.4	V
Trr	Reverse Recovery Time	VGS=0V,IS=5.0A	_	330	_	ns
Qrr	Reverse Recovery charge	dif/dt=100A/us (Note 4)	_	2.67	_	uc

Notes:

1. Repetitive Rating : Pulse width limited by maximum junction temperature
2. L = 27.5mH, IAS = 4.0A, VDD = 50V, RG = 25 Ω, Starting TJ = 25°C
3. ISD ≤ 4.0A, di/dt ≤ 300A/μs, VDD ≤ BVDSS, Starting TJ = 25°C
4. Pulse Test : Pulse width ≤ 300μs, Duty cycle ≤ 2%
5. Essentially independent of operating temperature

Typical Characteristics

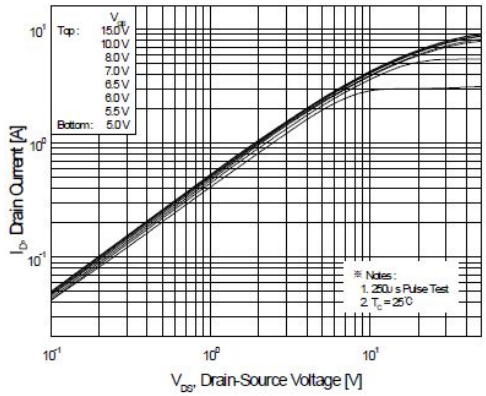


Figure1. On-Region Characteristics

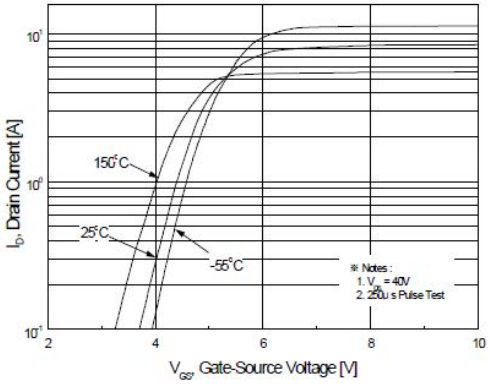


Figure2. Transfer Characteristics

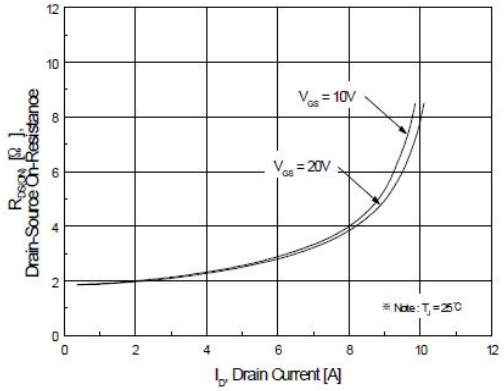


Figure3. On-Resistance Variation vs Drain Current and Gare Voltage

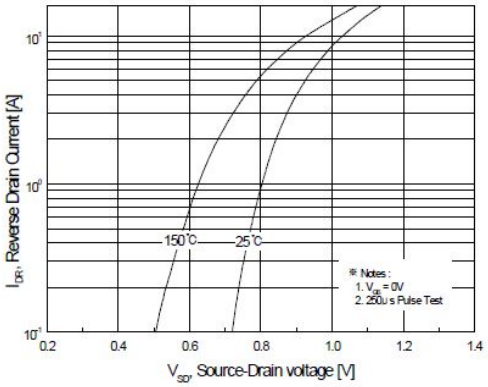


Figure4. Body Diode Forward Voltage Variation with Source Current and Temperature

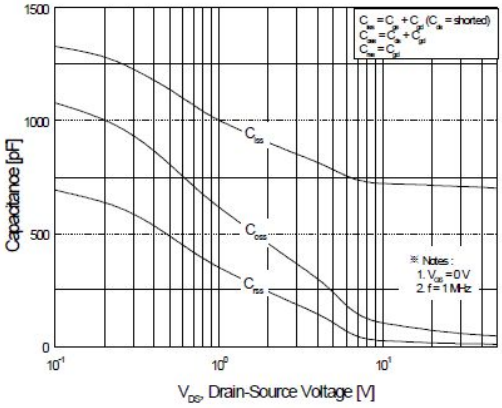


Figure5. Capacitance Characteristics

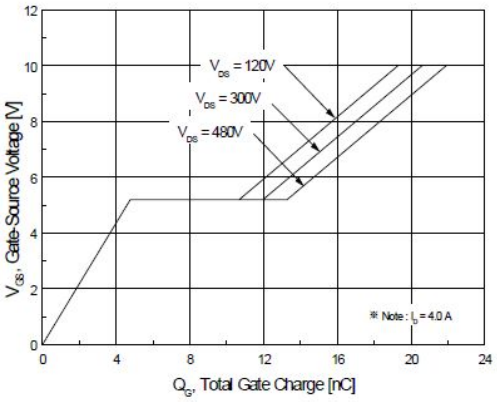


Figure6. Gate Charge Characteristics

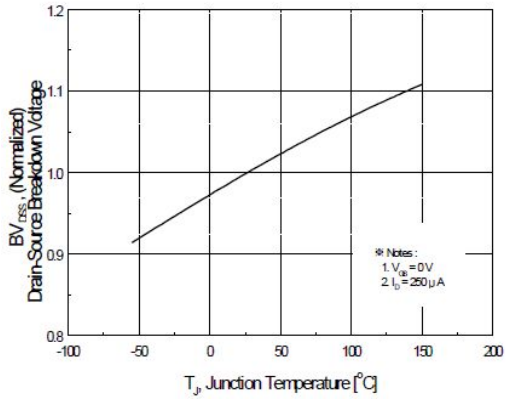


Figure7. Breakdown Voltage Variation vs Temperature

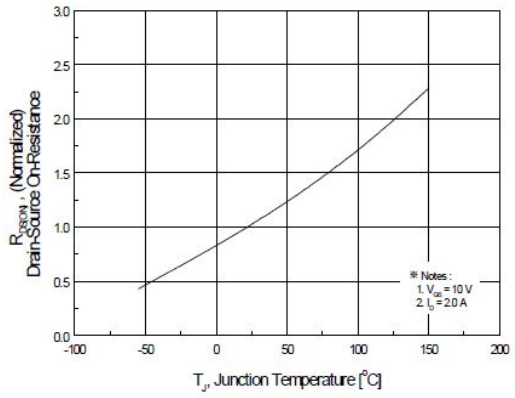


Figure8. On-Resistance Variation vs Temperature

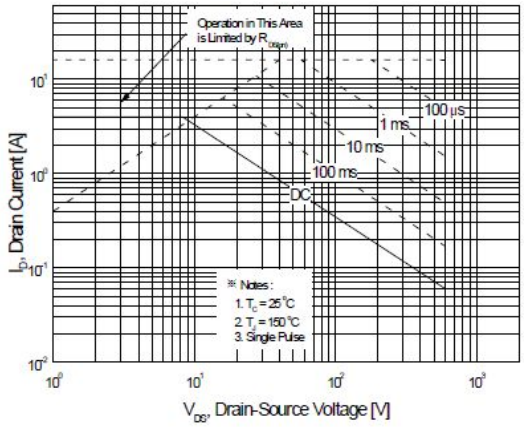


Figure9. Maximum Safe Operating Area

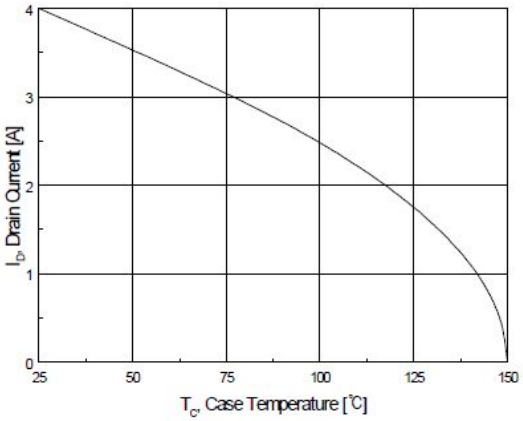


Figure10. Maximum Drain Current vs Case Temperature

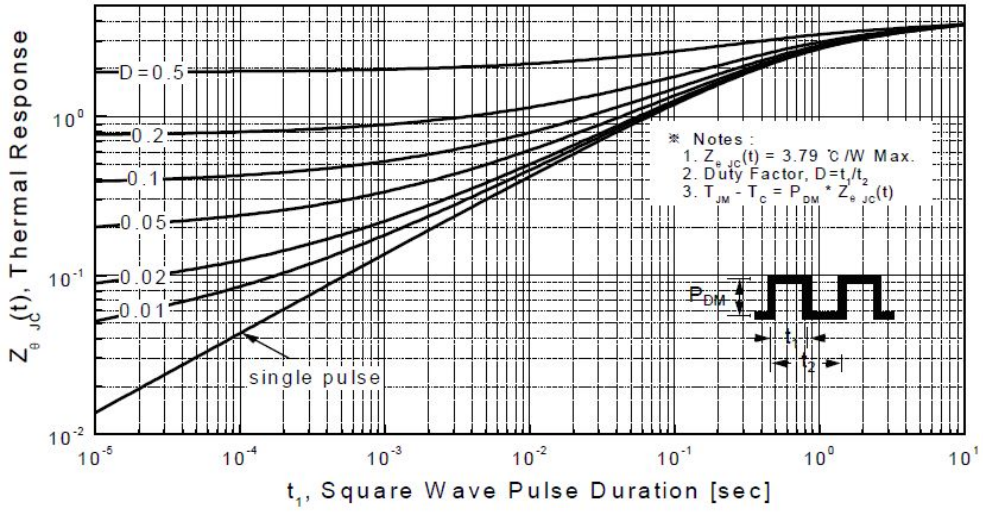
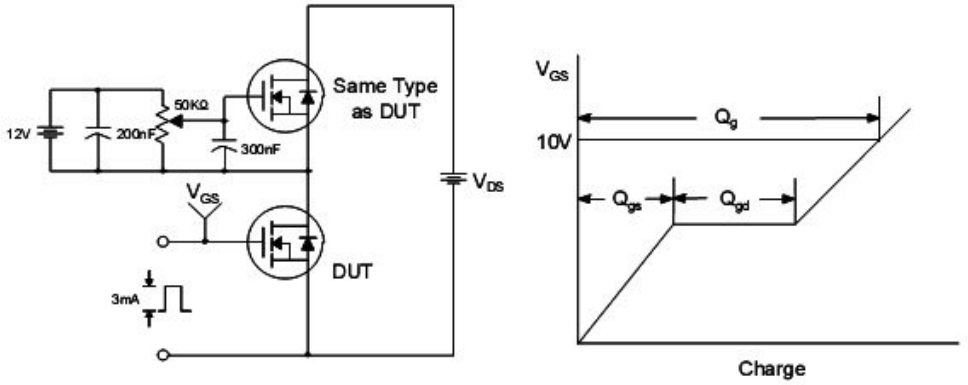


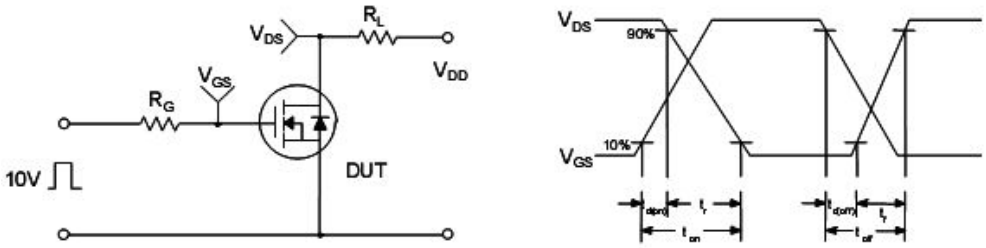
Figure11. Transient Thermal Response Curve

Test circuits and waveforms

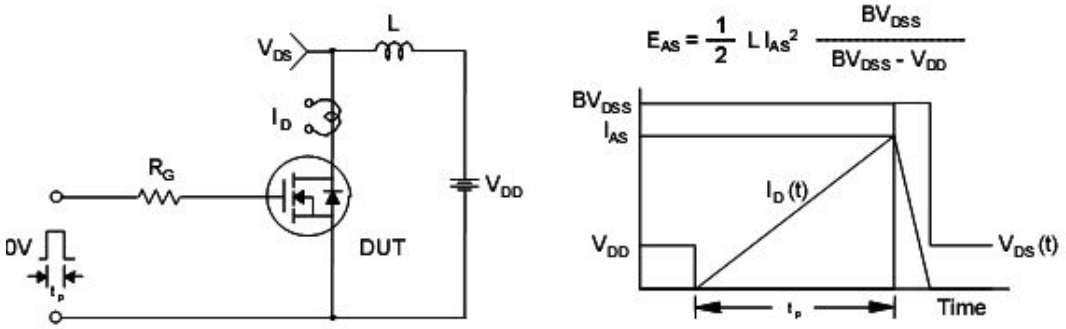
Gate Charge Test Circuit & Waveform



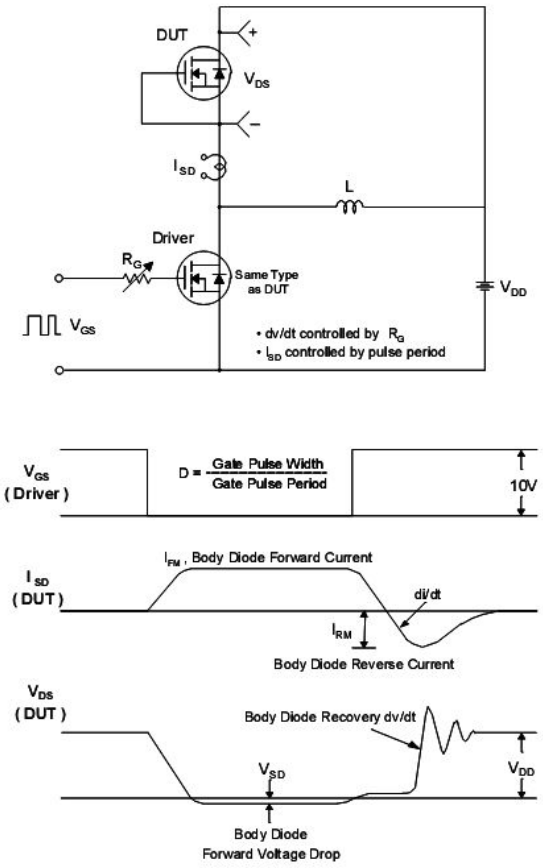
Resistive Switching Test Circuit & Waveforms



Unclamped Inductive Switching Test Circuit & Waveforms



Peak Diode Recovery dv/dt Circuit & Waveforms



Mechanical Dimensions