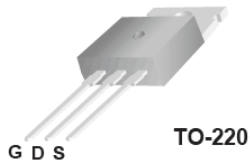


TSP60R150WT

600V 22A N-Channel SJ-MOSFET

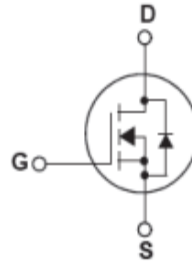
General Description

Truesemi SJ-FET is new generation of high voltage MOSFET family that is utilizing an advanced charge balance mechanism for outstanding low on-resistance and lower gate charge performance. This advanced technology has been tailored to minimize conduction loss, provide superior switching performance, and withstand extreme dv/dt rate and higher avalanche energy. SJ-FET is suitable for various AC/DC power conversion in switching mode operation for higher efficiency.



Features

- 650V @T_J = 150 °C
- Max. RDS(on) = 0.15Ω
- Ultra Low gate charge (typ. Q_g = 41nC)
- 100% avalanche tested



Absolute Maximum Ratings

T_C=25°C unless otherwise specified

Symbol	Parameter	Value	Unit
V _{DSS}	Drain-Source Voltage	600	V
I _D	Drain Current -Continuous (T _C = 25°C) -Continuous (T _C = 100°C)	22.0 13.9	A
I _{DM}	Drain Current – Pulsed (Note 1)	60	A
V _{GSS}	Gate-Source voltage	±30	V
E _{AS}	Single Pulsed Avalanche Energy (Note 2)	180	mJ
P _D	Power Dissipation (T _C = 25°C)	192	W
T _J , T _{STG}	Operating and Storage Temperature Range	-55 to +150	°C
T _L	Maximum Lead Temperature for Soldering Purpose, 1/8" from Case for 5 Seconds	260	°C

* Drain current limited by maximum junction temperature.

Thermal Characteristics

Symbol	Parameter	Typ.	Max.	Unit
R _{θJC}	Thermal Resistance, Junction-to-Case	--	0.65	°C/W
R _{θCS}	Thermal Resistance, Case-to-Sink	0.5	--	°C/W
R _{θJA}	Thermal Resistance, Junction-to-Ambient	--	62.5	°C/W

Electrical Characteristics $T_J = 25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
Off Characteristics						
BV _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA,	600	--	--	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 600V, V _{GS} = 0V T _J = 25℃ V _{DS} = 480V, V _{GS} = 0V T _J = 125℃	--	--	10 100	μA μA
I _{GSS}	Gate-Body Leakage Current,	V _{GS} = ±30V, V _{DS} = 0V	--	--	±100	nA
On Characteristics						
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	2.0	--	4.0	V
R _{DS(on)}	Static Drain-Source On-Resistance	V _{GS} = 10V, I _D = 11A	--	0.13	0.15	Ω
g _{FS}	Forward Transconductance	V _{DS} = 10V, I _D = 11A	--	18.8	--	S
Dynamic Characteristics						
C _{iss}	Input Capacitance	V _{DS} = 50V, V _{GS} = 0V, f = 1.0MHz	--	1600	2100	pF
C _{oss}	Output Capacitance		--	225	295	pF
C _{rss}	Reverse Transfer Capacitance		--	14	18.5	pF
Switching Characteristics						
t _{d(on)}	Turn-On Delay Time	V _{DS} = 300V, I _D = 22A R _G = 25Ω	--	48	104	ns
t _r	Turn-On Rise Time		--	108	220	ns
t _{d(off)}	Turn-Off Delay Time		--	176	360	ns
t _f	Turn-Off Fall Time		--	50	108	ns
Q _g	Total Gate Charge	V _{DS} = 480V, I _D = 22A V _{GS} = 10V	--	41	53	nC
Q _{gs}	Gate-Source Charge		--	8	--	nC
Q _{gd}	Gate-Drain Charge		--	15	--	nC
Drain-Source Diode Characteristics and Maximum Ratings						
I _S	Maximum Continuous Drain-Source Diode Forward Current		--	--	22	A
I _{SM}	Maximum Pulsed Drain-Source Diode Forward Current		--	--	60	A
V _{SD}	Drain-Source Diode Forward Voltage	V _{GS} = 0V, I _F = 22A	--	--	1.2	V
t _{rr}	Reverse Recovery Time	V _{GS} = 0V, I _F = 22A di _F /dt =100A/μs	--	440	--	ns
Q _{rr}	Reverse Recovery Charge		--	5	--	μC

NOTES:

1. Repetitive Rating: Pulse width limited by maximum junction temperature
2. $I_{AS}=6A, V_{DD}=50V, R_G=25\Omega$, Starting $T_J=25^\circ\text{C}$
3. Pulse Test: Pulse width $\leq 300\mu s$, Duty Cycle $\leq 2\%$

Typical Performance Characteristics

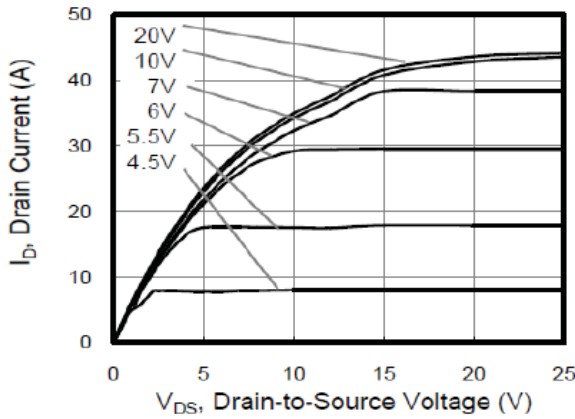


Figure 1. On Region Characteristics

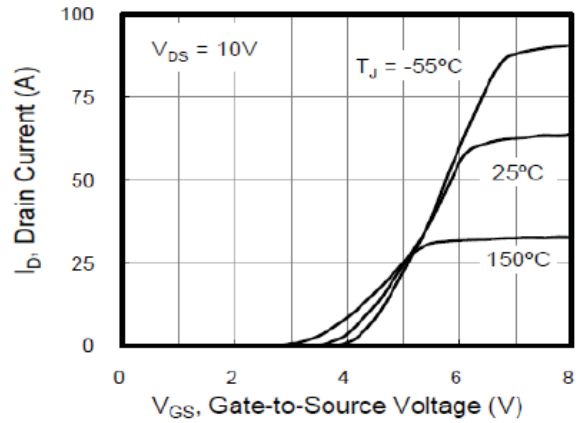


Figure 2. Transfer Characteristics

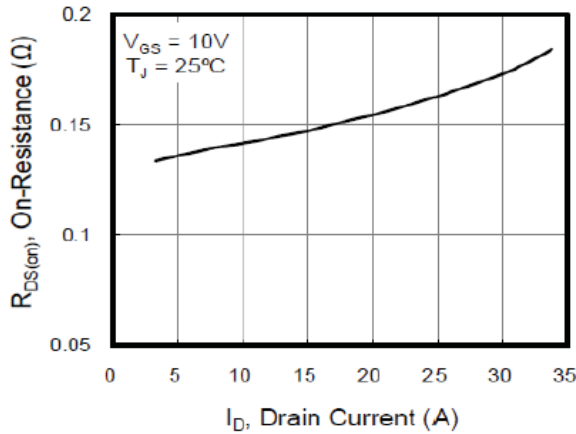


Figure 3. On Resistance Variation vs Drain Current and Gate Voltage

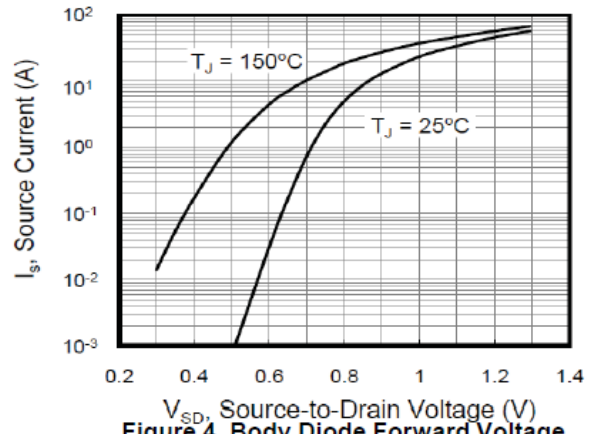


Figure 4. Body Diode Forward Voltage Variation with Source Current and Temperature

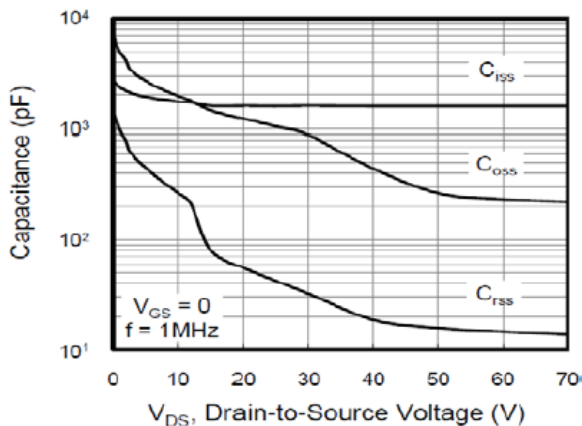


Figure 5. Capacitance Characteristics

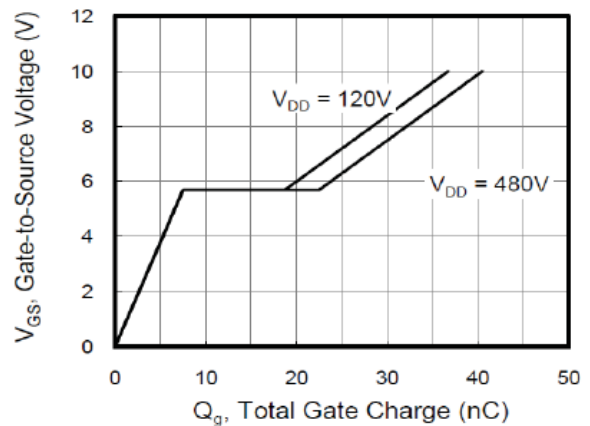


Figure 6. Gate Charge Characteristics

Typical Performance Characteristics

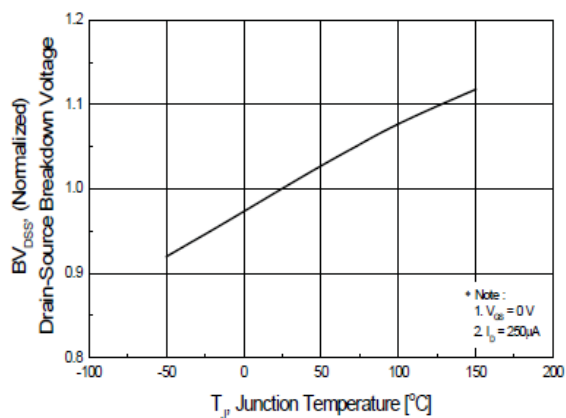


Figure 7. Breakdown Voltage Variation vs Temperature

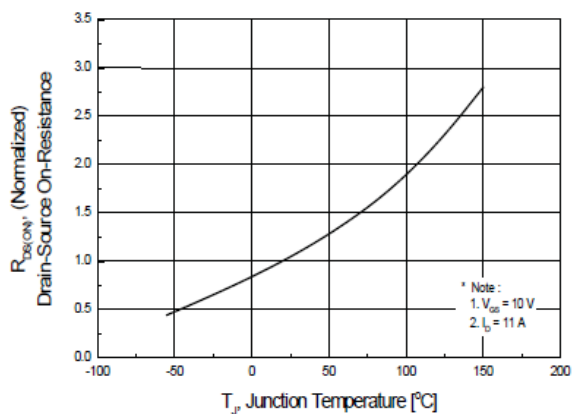


Figure 8. On-Resistance Variation vs Temperature

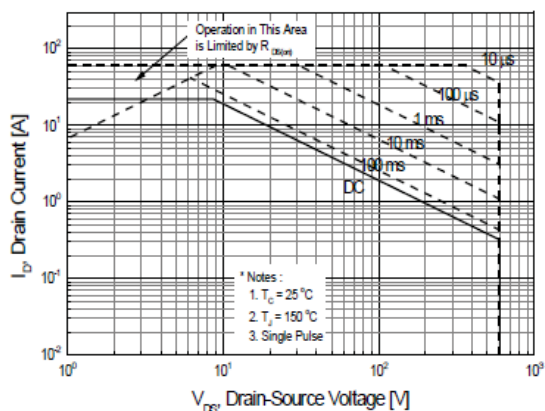


Figure 9. Maximum Safe Operating Area

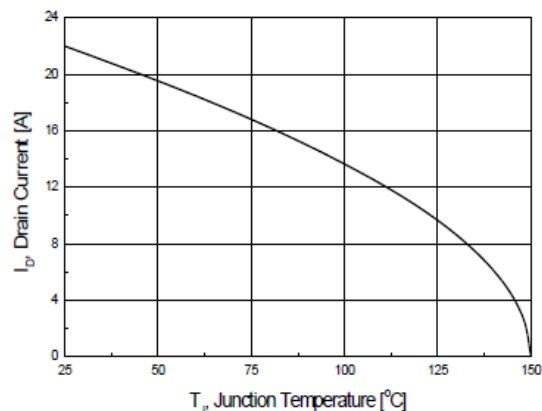


Figure 10. Maximum Drain Current vs Case Temperature

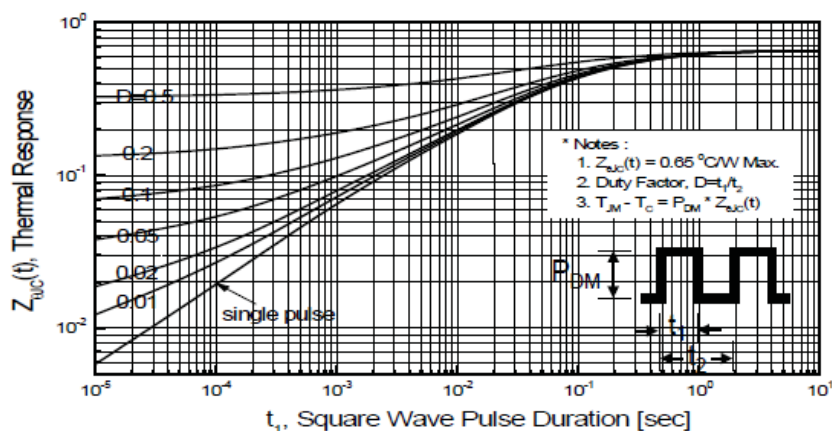
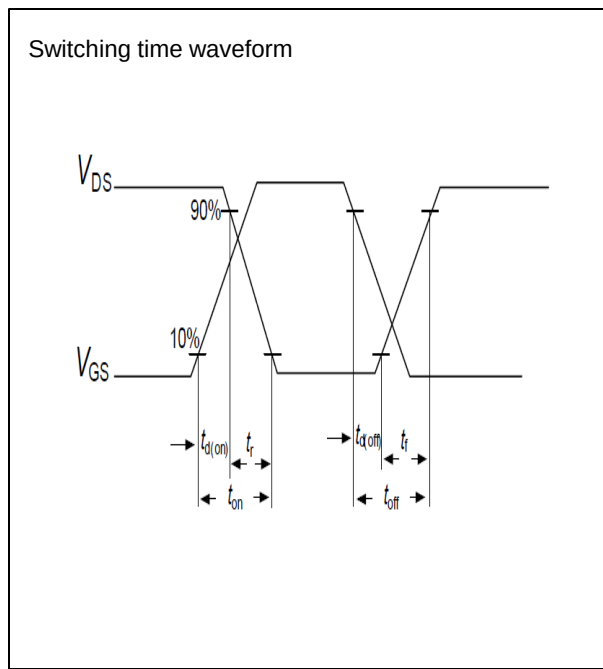
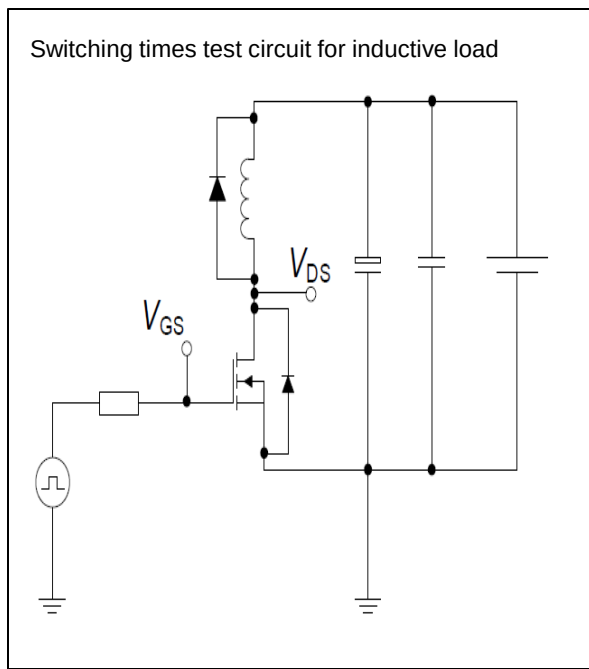


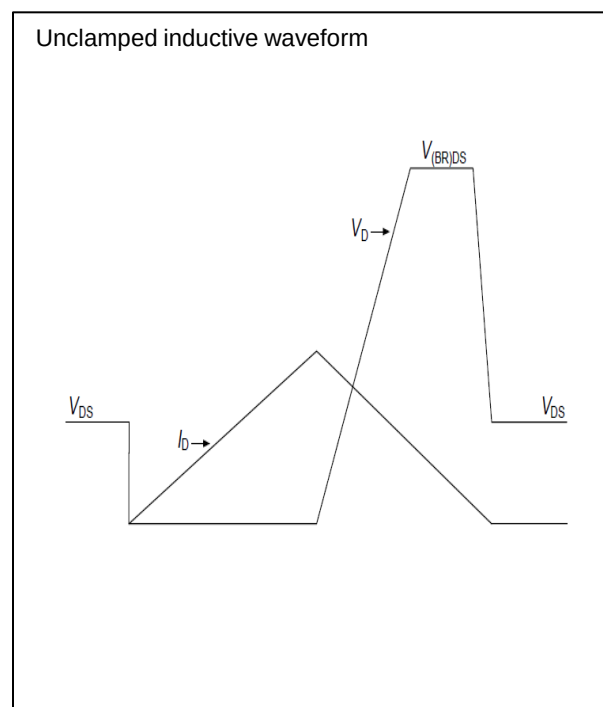
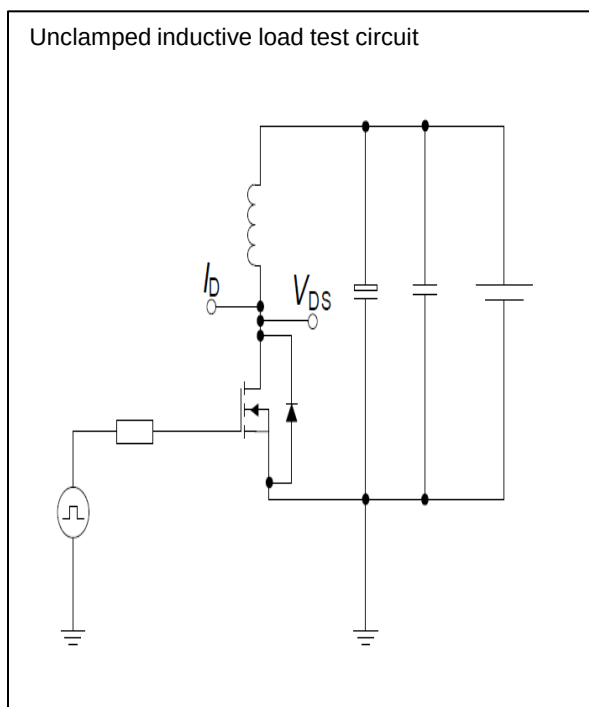
Figure 11. Transient Thermal Response Curve

Test circuits

Switching times test circuit and waveform for inductive load



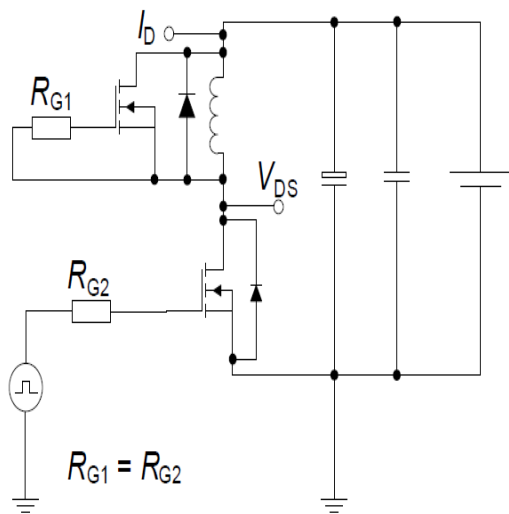
Unclamped inductive load test circuit and waveform



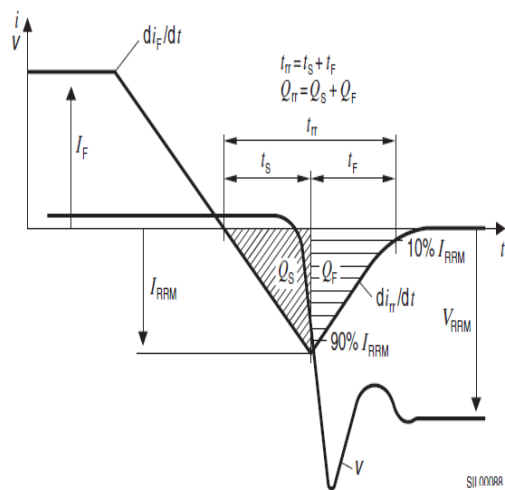
Test circuits

Test circuit and waveform for diode characteristics

Test circuit for diode characteristics

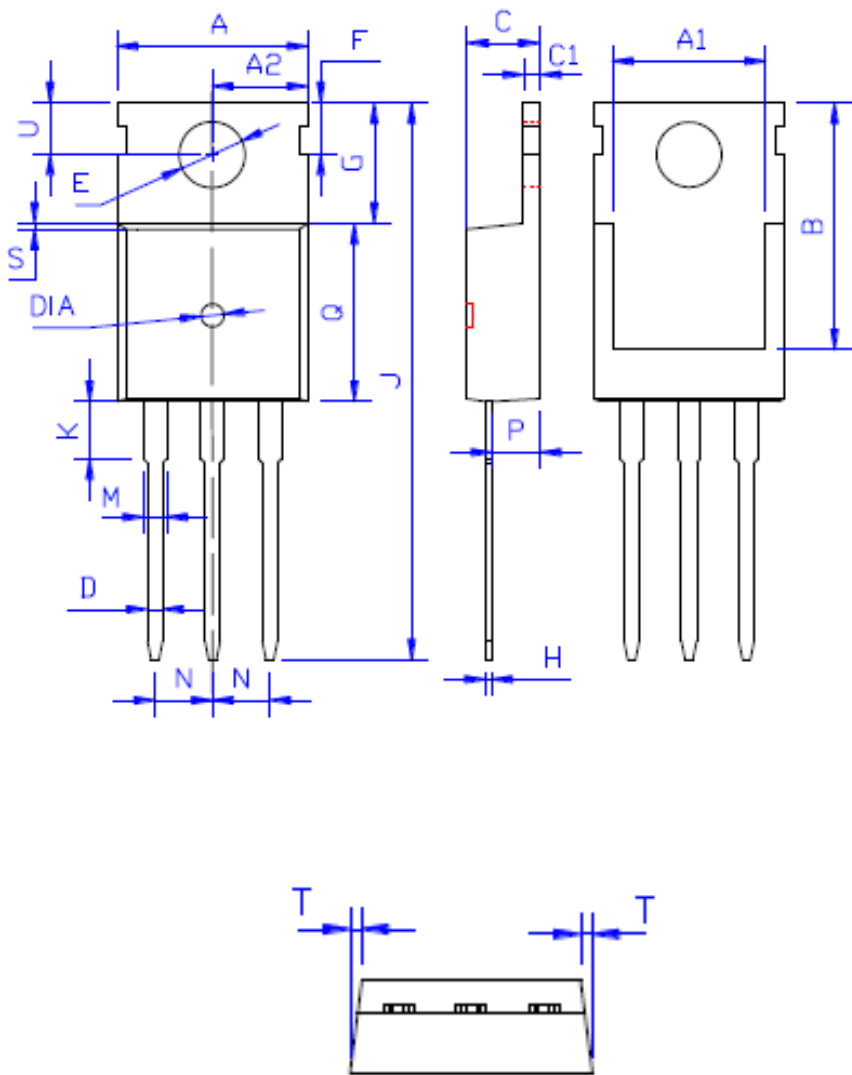


Diode recovery waveform



Package Outline TO-220

TSP60R150WT 600V 22A N-Channel SJ-MOSFET



DIM	MILLIMETERS
A	10.00±0.30
A1	8.00±0.30
A2	5.00±0.30
B	13.20±0.40
C	4.50±0.20
C1	1.30±0.20
D	0.80±0.20
E	3.60±0.20
F	3.00±0.30
G	6.60±0.40
H	0.50±0.20
J	28.88±0.50
K	3.00±0.30
M	1.30±0.30
N	Typical 2.54
P	2.40±0.40
Q	9.20±0.40
S	0.25±0.15
T	0.25±0.15
U	2.80±0.30
DIA	宽 1.50±0.10 深 0.50 MAX