Pb Free Plating Product

TSP8592

85V,92A N-Channel Trench Process Power MOSFETs

General Description

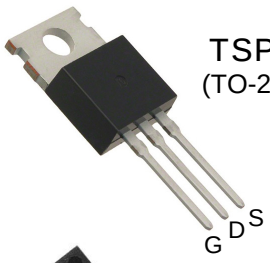
TSP8592 series is N-channel MOS Field Effect Transistor designed for high current switching applications. Rugged E_{AS} capability and ultra low $R_{DS(ON)}$ is suitable for PWM, load switching especially for E-Bike controller applications.

Features

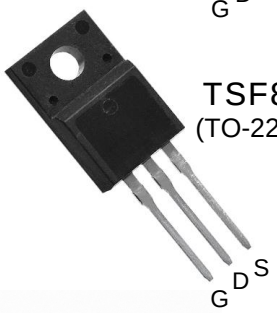
- V_{DS}=85V; I_D=92A@ V_{GS}=10V; $R_{DS(ON)}$<7.45mΩ @ V_{GS}=10V
- Special Designed for E-Bike Controller Application
- Ultra Low On-Resistance
- High UIS and UIS 100% Test

Application

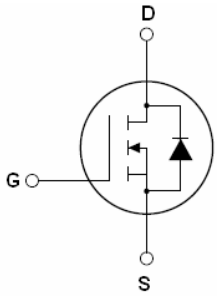
- 64V E-Bike Controller Applications
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply
- Inverter Application
- Amplifier Application



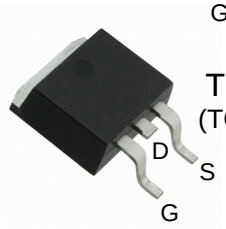
TSP8592
(TO-220 HeatSink)



TSF8592
(TO-220F FullPak)



Schematic Diagram



TSB8592
(TO-263/D2PAK)

V_{DS} = 85 V

I_D = 92A

$R_{DS(ON)}$ = 6.2 mΩ

Table 1. Absolute Maximum Ratings (TA=25℃)

Symbol	Parameter	Value	Unit
V_{DS}	Drain-Source Voltage (V_{GS}=0V)	85	V
V_{GS}	Gate-Source Voltage (V_{DS}=0V)	±25	V
$I_{D\ (DC)}$	Drain Current (DC) at Tc=25℃	92	A
$I_{D\ (DC)}$	Drain Current (DC) at Tc=100℃	64.4	A
$I_{DM\ (pluse)}$	Drain Current-Continuous@ Current-Pulsed **(Note 1)**	368	A
dv/dt	Peak Diode Recovery Voltage	30	V/ns
P_D	Maximum Power Dissipation(Tc=25℃)	139	W
	Derating Factor	0.93	W/℃
E_{AS}	Single Pulse Avalanche Energy **(Note 2)**	625	mJ
T_J,T_{STG}	Operating Junction and Storage Temperature Range	-55 To 175	℃

Notes 1.Repetitive Rating: Pulse width limited by maximum junction temperature

2.E_{AS} condition:T_J=25℃,V_{DD}=40V,V_G=10V,R_G=25Ω

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Table 2. Thermal Characteristic

Symbol	Parameter	Value	Unit
$R_{\theta JC}$	Thermal Resistance,Junction-to-Case	1.08	℃/W

Table 3. Electrical Characteristics (TA=25℃unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
On/Off States						
BV_{DSS}	Drain-Source Breakdown Voltage	V_{GS}=0V I_D=250μA	82			V
I_{DSS}	Zero Gate Voltage Drain Current(Tc=25℃)	V_{DS}=82V,V_{GS}=0V			1	μA
I_{DSS}	Zero Gate Voltage Drain Current(Tc=125℃)	V_{DS}=82V,V_{GS}=0V			10	μA
I_{GSS}	Gate-Body Leakage Current	V_{GS}=±20V,V_{DS}=0V			±100	nA
$V_{GS(th)}$	Gate Threshold Voltage	V_{DS}=V_{GS},I_D=250μA	2		4	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=40A		6.2	7.45	mΩ
Dynamic Characteristics						
g_{FS}	Forward Transconductance	V_{DS}=10V,I_D=15A	20			S
C_{iss}	Input Capacitance	V_{DS}=25V,V_{GS}=0V, f=1.0MHz		5053		PF
C_{oss}	Output Capacitance			442		PF
C_{rss}	Reverse Transfer Capacitance			145		PF
Q_g	Total Gate Charge	V_{DS}=50V,I_D=40A, V_{GS}=10V		106		nC
Q_{gs}	Gate-Source Charge			19		nC
Q_{gd}	Gate-Drain Charge			47.9		nC
Switching Times						
$t_{d(on)}$	Turn-on Delay Time	V_{DD}=30V,I_D=40A,R_L=15Ω V_{GS}=10V,R_G=2.5Ω		15		nS
t_r	Turn-on Rise Time			18		nS
$t_{d(off)}$	Turn-Off Delay Time			31		nS
t_f	Turn-Off Fall Time			38		nS
Source-Drain Diode Characteristics						
I_{SD}	Source-drain Current(Body Diode)			92		A
I_{SDM}	Pulsed Source-Drain Current(Body Diode)			368		A
V_{SD}	Forward On Voltage**(Note 1)**	T_J=25℃,I_{SD}=40A,V_{GS}=0V		0.78	0.95	V
t_{rr}	Reverse Recovery Time**(Note 1)**	T_J=25℃,I_F=75A di/dt=100A/μs		56		nS
Q_{rr}	Reverse Recovery Charge**(Note 1)**			113		nC
t_{on}	Forward Turn-on Time	Intrinsic turn-on time is negligible(turn-on is dominated by L_S+L_D)				

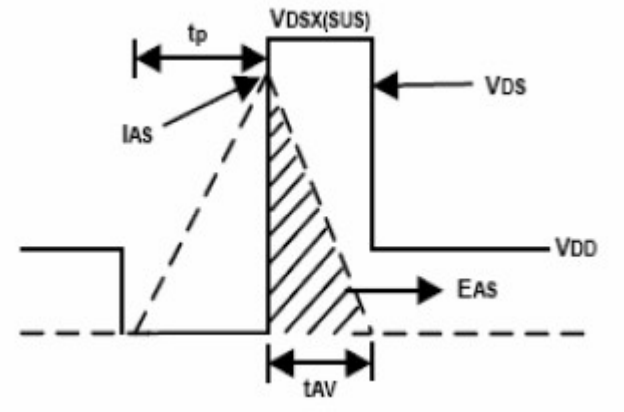
Notes 1.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 1.5%, R_G=25Ω, Starting T_J=25℃

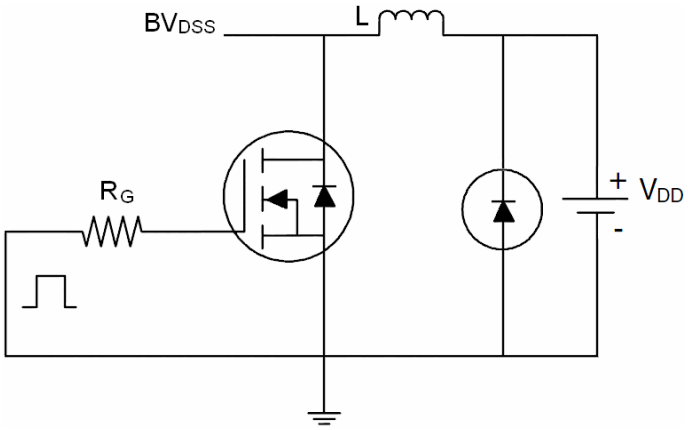
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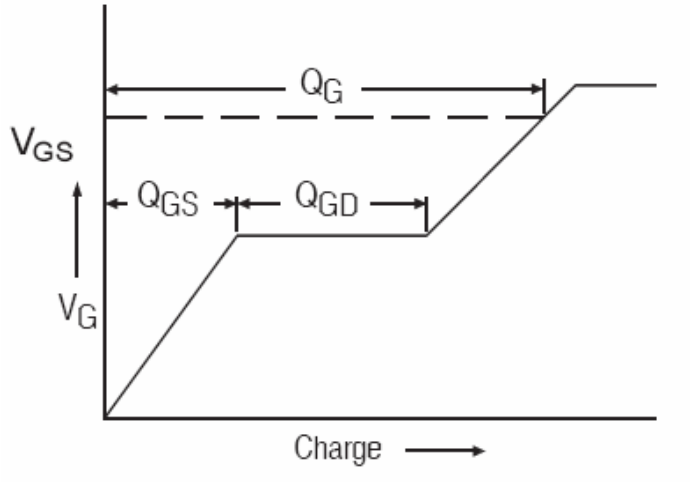
Test Circuit

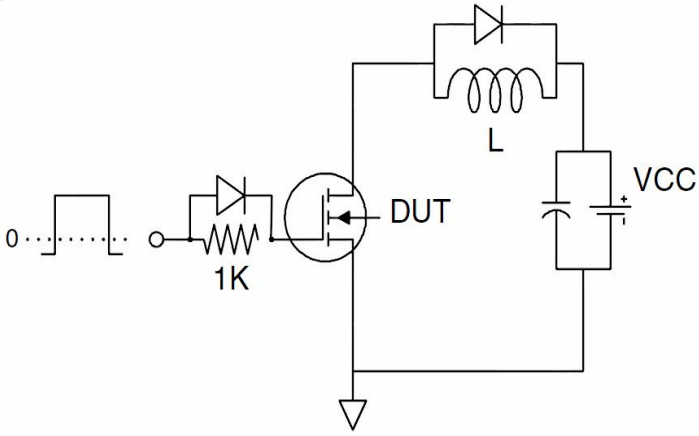
1) E_{AS} Test Circuits



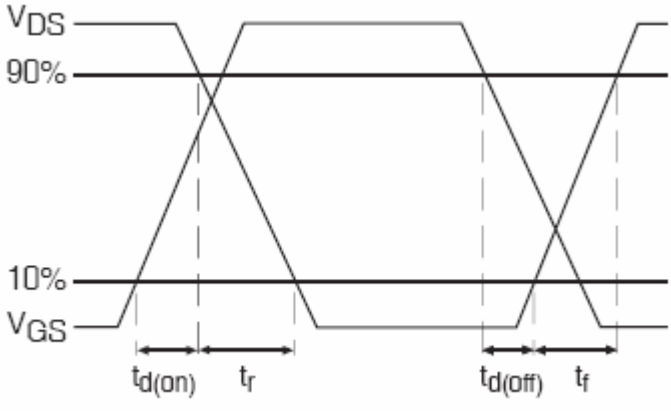


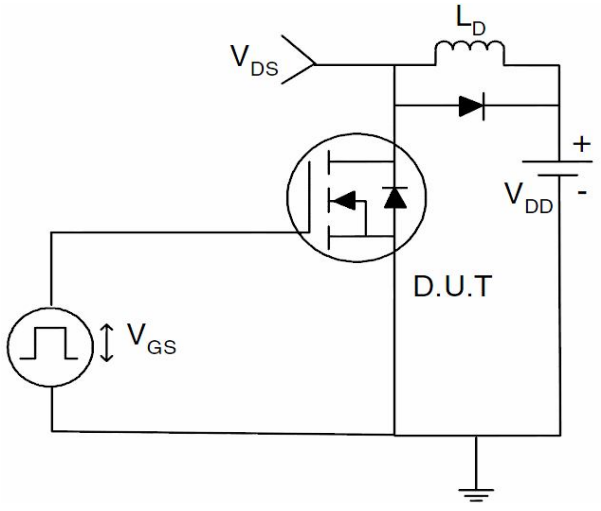
2) Gate Charge Test Circuit:





3) Switch Time Test Circuit:





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TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS (Curves)

Figure1. Output Characteristics

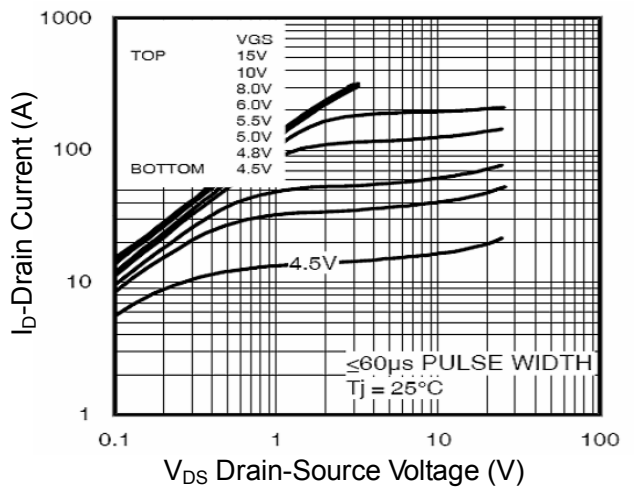


Figure2. Transfer Characteristics

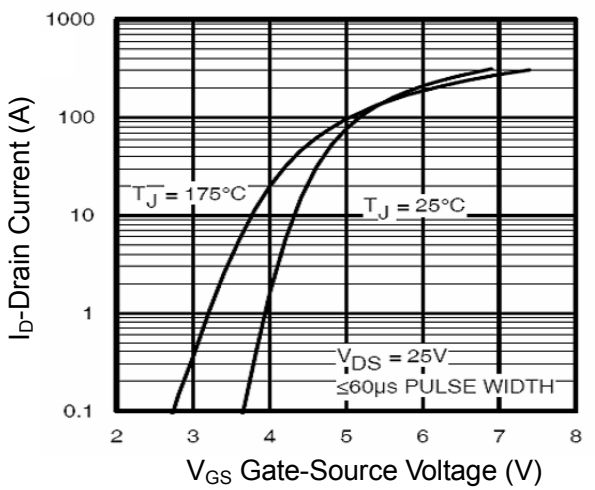


Figure3. Rdson Vs Drain Current

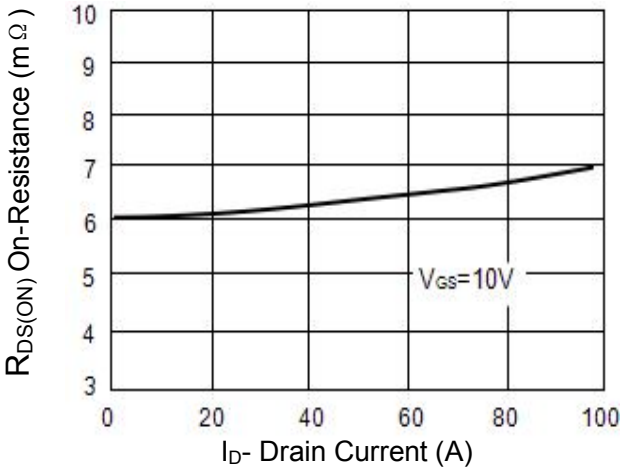


Figure4. Rdson Vs Junction Temperature

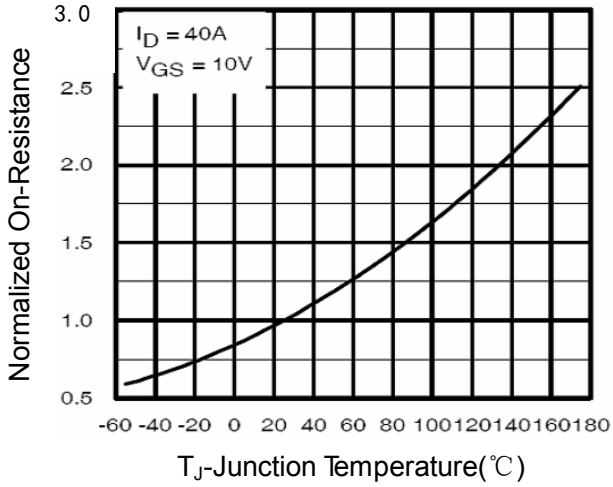


Figure5. Gate Charge

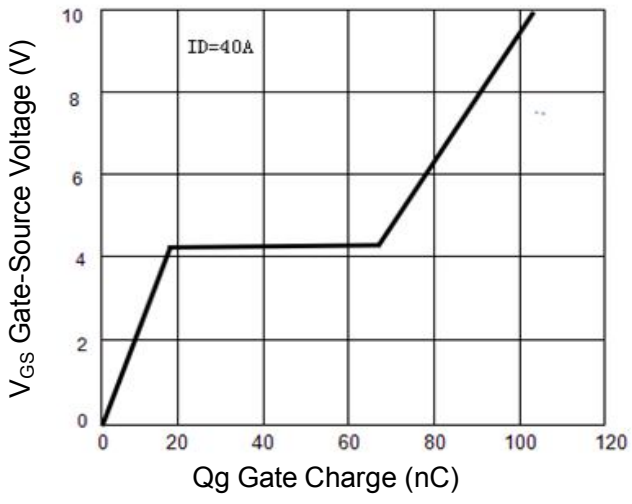
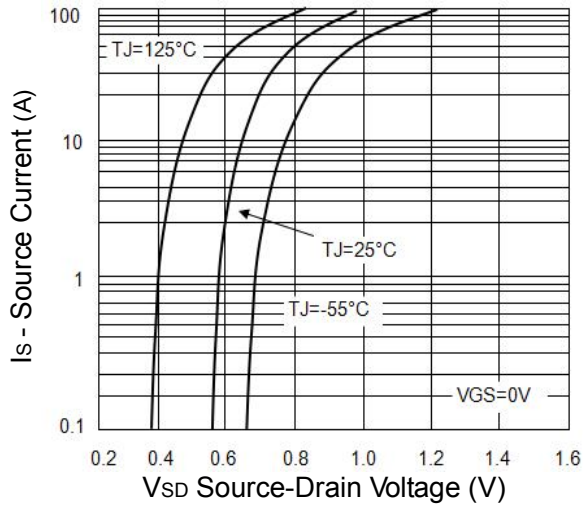


Figure6. Source- Drain Diode Forward



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Figure7. Capacitance vs Vds

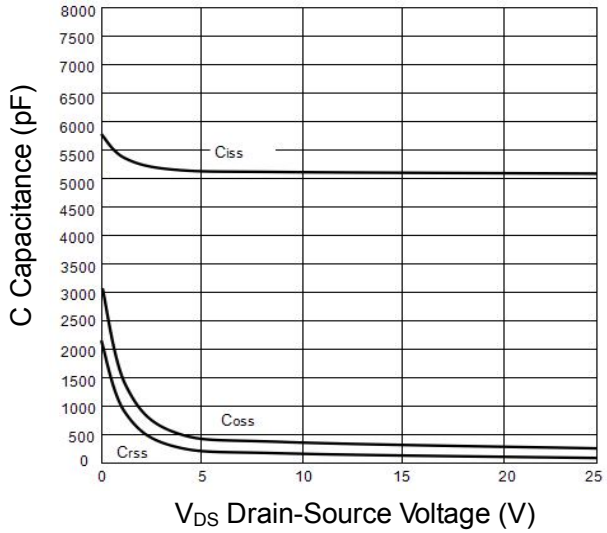


Figure8. Safe Operation Area

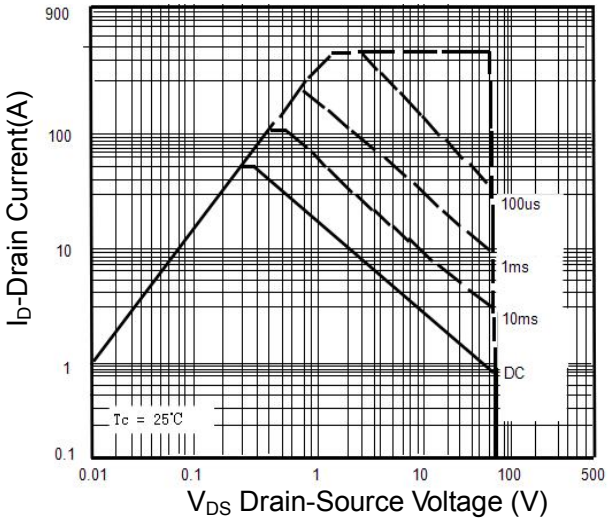


Figure9. BVDSS vs Junction Temperature

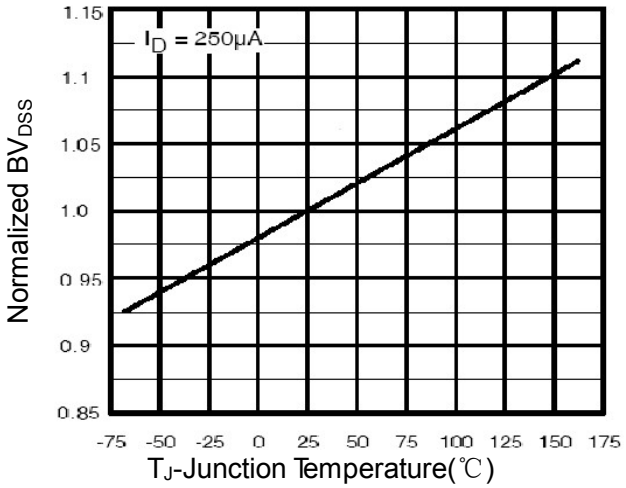


Figure10. VGS(th) vs Junction Temperature

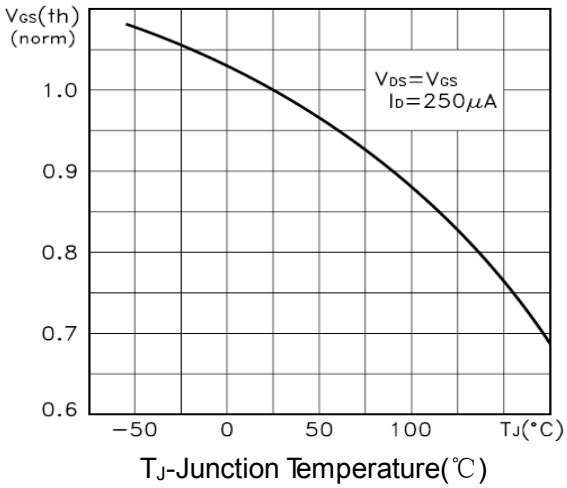
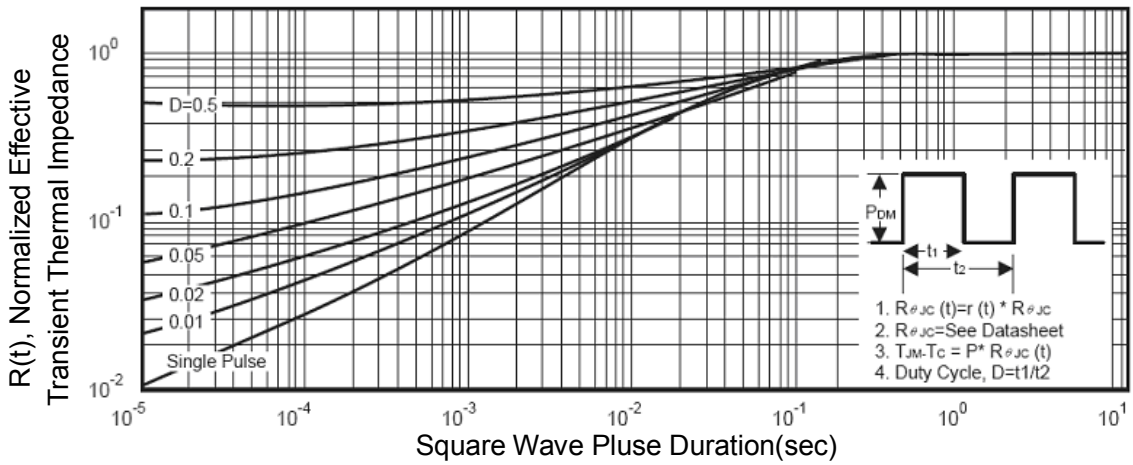


Figure11. Normalized Maximum Transient Thermal Impedance



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