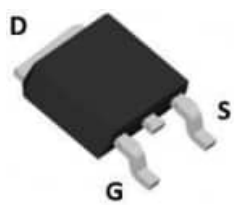
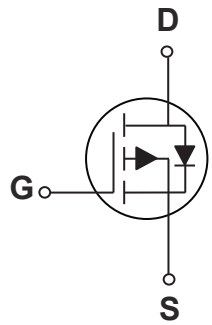
60V P-Channel MOSFET

Main Product Characteristics:

$V_{(BR)DSS}$	-60V
$R_{DS(ON)}$	17mΩ(max.)
I_D	-70 A



TO-252



Features and Benefits

- Standard Turbo MOSFET process technology.
- Optimized the cell structure.
- Low on-resistance and low gate charge.
- Featuring low switching and drive losses.
- Fast switching and reverse body recovery.
- High ruggedness and robustness.

Description

The ST series products utilizes Trust's outstanding standard turbo process and packaging techniques to achieve ultral low on-resistance and low gate charge and to provide the industry's best-in-class performance.

These features make this series products extremely efficient, temperature characteristics and reliable for use in power management, synchronous rectification, battery protection, load switch and a wide variety of other applications.

Absolute Maximum Ratings (T_A=25°C unless otherwise specified)

Parameter	Symbol	Max.	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous (T_C=25°C), V_{GS}=10V[1]	I_D	-70	A
Drain Current-Continuous (T_C=100°C), V_{GS}=10V[1]		-55	A
Drain Current-Pulsed[2]	I_{DM}	-280	A
Pulsed Source Current (Body Diode)[2]	I_{SM}	-280	A
Maximum Power Dissipation (T_C=25°C)[3]	P_D	170	W
Single Pulse Avalanche Energy (L=0.3mH)	E_{AS}	300	mJ
Single Pulse Avalanche Current (L=0.3mH)	I_{AS}	44	A
Junction-to-Ambient (t ≤ 10s)[4]	$R_{\theta JA}$	62	°C/W
Maximum Junction-to-Case[5]	$R_{\theta JC}$	0.73	°C/W
Operating Junction Temperature Range	T_J	-55 To +150	°C
Storage Temperature Range	T_{STG}	-55 To +150	°C

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Electrical Characteristics (T_A=25°C unless otherwise specified)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250uA	-60	-	-	V
Drain-to-Source Leakage Current	I_{DSS}	V_{DS}=-60V, V_{GS}=0V	-	-	-1	μA
Drain-to-Source Leakage Current		V_{DS}=-60V, V_{GS}=0V T_J=125°C	-	-	-50	μA
Gate-to-Source Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{GS}=V_{DS}, I_D=-250uA	-1.0	-	-3	V
Drain Static-Source On-Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-23A	-	12	17	mΩ
		V_{GS}=-4.5V, I_D=-10A	-	17	27	mΩ
Dynamic and Switching Characteristics						
Total Gate Charge	Q_g	V_{DD}=-40V, I_D=-30A V_{GS}=-10V	-	110	150	nC
Gate-Source Charge	Q_{gs}		-	16.5	30	
Gate-Drain Charge	Q_{gd}		-	23.2	40	
Turn-On Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_G=3Ω R_L=1.5Ω, V_{GS}=-10V, I_D=-20A	-	8.0	-	nS
Rise Time	t_r		-	26.5	-	
Turn-Off Delay Time	$t_{d(off)}$		-	105.2	-	
Fall Time	t_f		-	142.1	-	
Input Capacitance	C_{lss}	V_{DS}=-25V, V_{GS}=0V, F=1MHz	-	4802	-	pF
Output Capacitance	C_{oss}		-	288	-	
Reverse Transfer Capacitance	C_{rss}		-	273	-	
Gate Resitance	R_g	F=1MHz	-	5.56	-	Ω
Source-Drain Ratings and Characteristics						
Maximum Body-Diode Continuous Current	I_S	MOSFET symbol showing the integral reverse p-n junction diode.	-	-70	-	A
Maximum Body-Diode Pulse Current	I_{SM}		-	-280	-	A
Diode Forward Voltage	V_{SD}	V_{GS}=0V, I_S=-10A, T_J=25°C	-	-0.74	-1.2	V
Reverse Recovery Time	t_{rr}	I_F=-20A di/dt=100A/μs T_J=25°C	-	22.3	-	nS
Reverse Recovery Charge	Q_{rr}		-	21.5	-	nC

Notes:

1.Calculated continuous current based on maximum allowable junction temperature.
2.Repetitive rating; pulse width limited by max. junction temperature.
3.The power dissipation P_D is based on max. junction temperature, using junction-to-case thermal resistance.
4.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_A =25°C

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Typical Electrical and Thermal Characteristic Curves

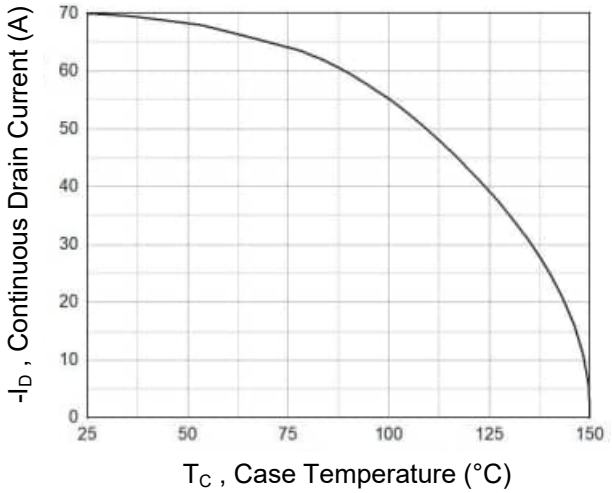

Fig.1 Continuous Drain Current vs. T_C

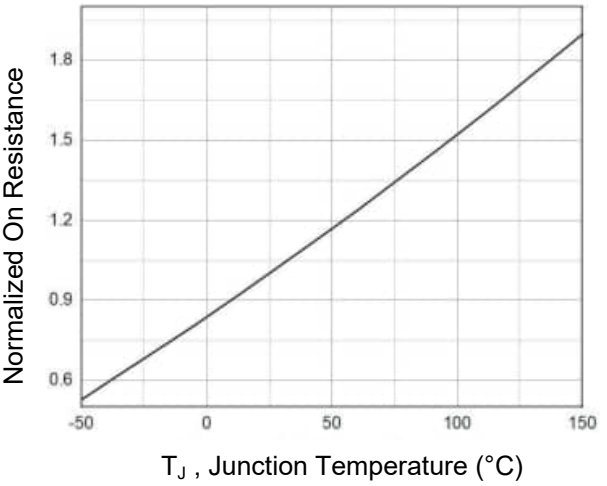

Fig.2 Normalized $R_{DS(ON)}$ vs. T_J

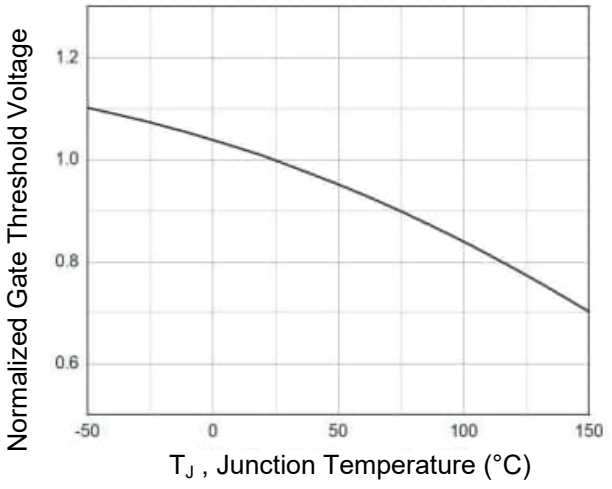

Fig.3 Normalized V_{th} vs. T_J

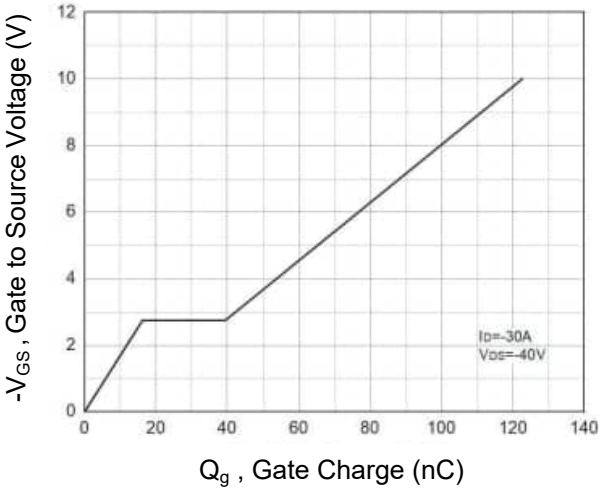

Fig.4 Gate Charge Waveform

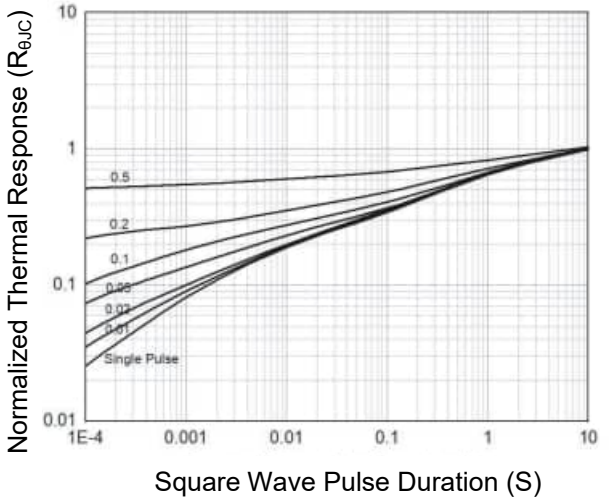

Fig.5 Normalized Transient Impedance

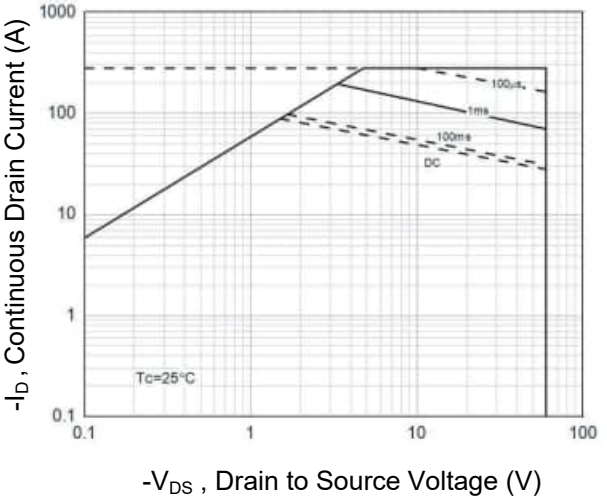

Fig.6 Maximum Safe Operation Area

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Test Circuits and Waveforms

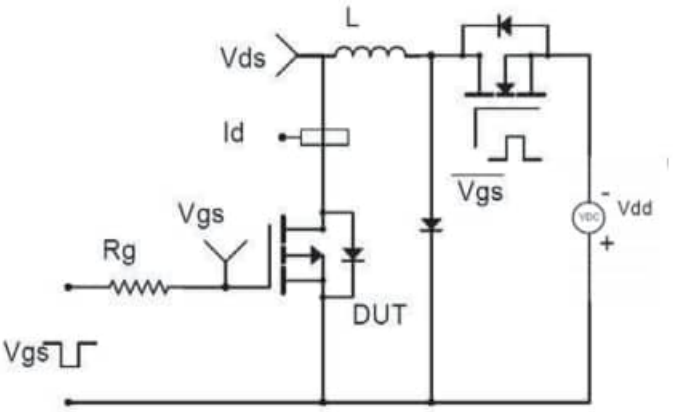

Figure 1. EAS Test Circuit

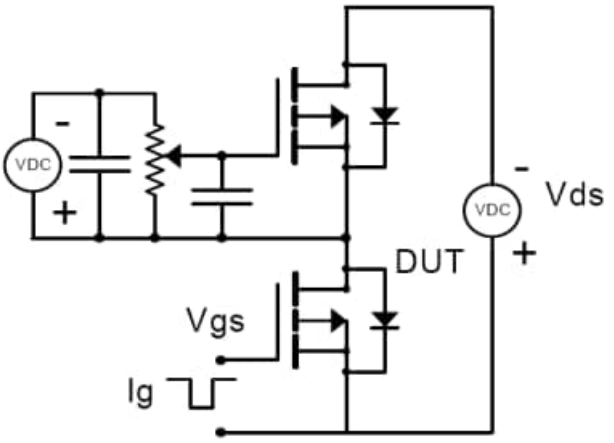

Figure 2. Gate Charge Test Circuit

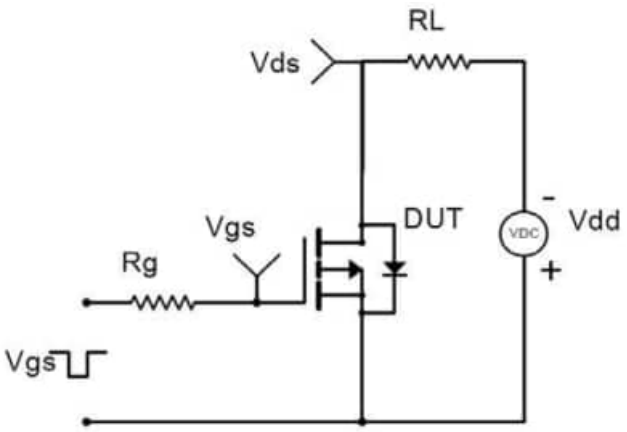

Figure 3. Switching Time Test Circuit

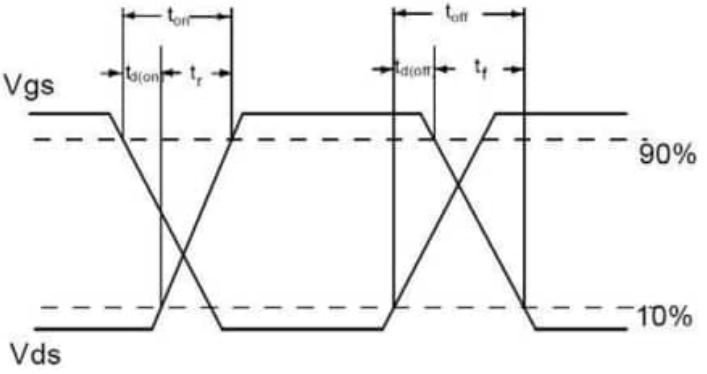

Figure 4. Switching Waveforms

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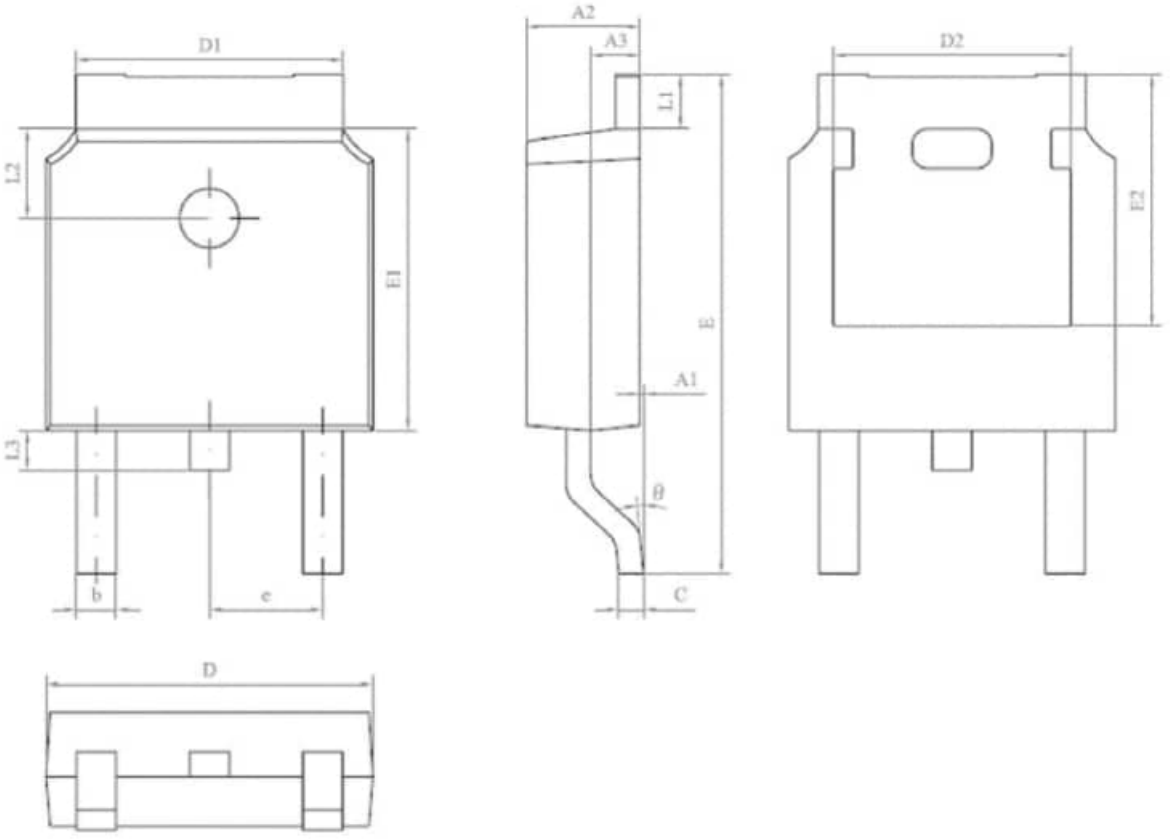
Package Outline Dimensions (TO-252/DPAK)



Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	MAX	MIN		MAX	MIN
A1	0.10	0.00	E	10.30	9.90
A2	2.40	2.20	E1	6.20	6.00
A3	1.10	0.09	E2	5.20	5.00
b	0.85	0.75	e	2.20	2.40
C	0.60	0.50	L1	1.25	0.90
D	6.70	6.50	L2	1.90	1.70
D1	5.50	5.30	L3	1.00	0.60
D2	4.90	4.70	θ	8°	0°