MT6809S

P-Channel Enhancement Mode Field Effect Transistor

MT Semiconductor®

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Product Summary

- V_{DS} = -60V
- I_D = -80A (VGS= -10V)
- $R_{DS(ON)}$ 11 mΩ @VGS= -10V

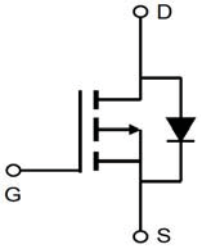
Features

- Advanced Trench Process Technology.
- High Density Cell Design for Ultra Low On-Resistance.
- Lead free product is acquired.
- RoHS Compliant.

Applications

- Power Switching Application
- Hard switched and high frequency circuit
- UPS
- Load Switch

Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT

TO-252-2L

Absolute Maximum Ratings (T_A = 25℃ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	-80	A
Drain Current-Continuous(T_C=100℃)	I_D (100℃)	-50	A
Pulsed Drain Current	I_{DM}	-2180	A
Maximum Power Dissipation	P_D	55	W
Derating factor		0.76	W/℃
Single pulse avalanche energy (Note 5)	E_{AS}	222	mJ
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance, Junction-to-Case (Note 2)	$R_{\theta JC}$	1.31	℃/W

Electrical Characteristics (T_C=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-60V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-2.6	-3.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-15A	-	11	22	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-10V,I_D=-20A	-	25	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-25V,V_{GS}=0V, F=1.0MHz	-	7460	-	PF
Output Capacitance	C_{oss}		-	819	-	PF
Reverse Transfer Capacitance	C_{rss}		-	635	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-30V, R_L=1.5Ω, V_{GS}=-10V,R_G=3Ω	-	18	-	nS
Turn-on Rise Time	t_r		-	19	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	nS
Turn-Off Fall Time	t_f		-	49	-	nS
Total Gate Charge	Q_g	V_{DS}=-30,I_D=-20A, V_{GS}=-10V	-	79		nC
Gate-Source Charge	Q_{gs}		-	19		nC
Gate-Drain Charge	Q_{gd}		-	21		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-20A	-		-1.2	V
Diode Forward Current (Note 2)	I_S		-	-	-80	A
Reverse Recovery Time	t_{rr}	TJ = 25°C, IF =-20A di/dt = -100A/μs(Note3)	-	55		nS
Reverse Recovery Charge	Qrr		-	65		nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. E_{AS} condition: Tj=25℃,V_{DD}=-30V,V_G=-10V,L=1mH,Rg=25Ω,I_{AS}=38A

Characteristics Curve

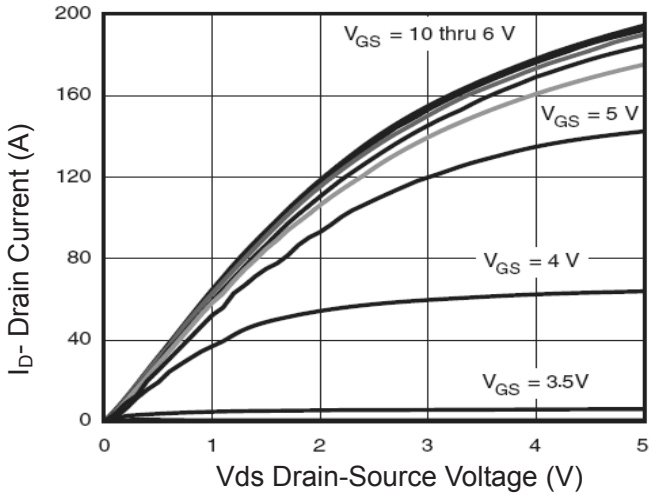


Figure 1 Output Characteristics

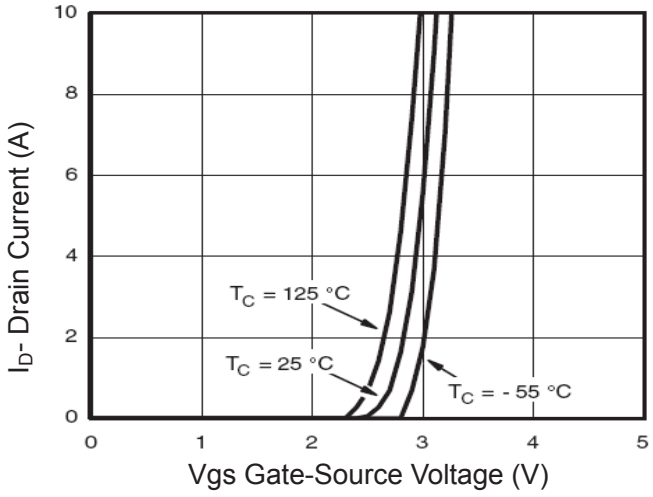


Figure 2 Transfer Characteristics

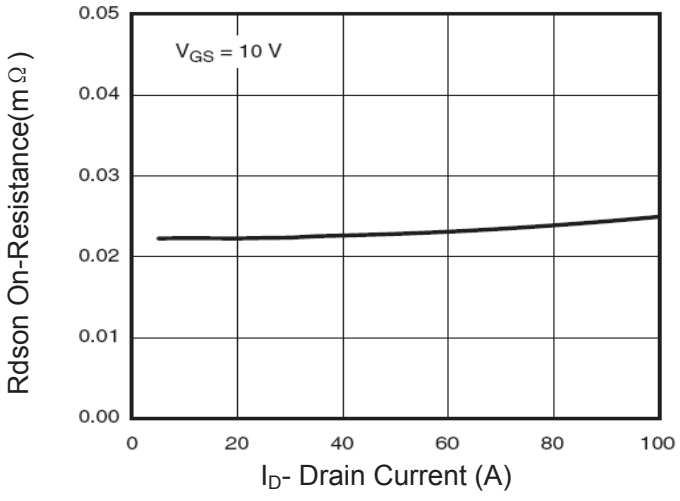


Figure 3 Rdson- Drain Current

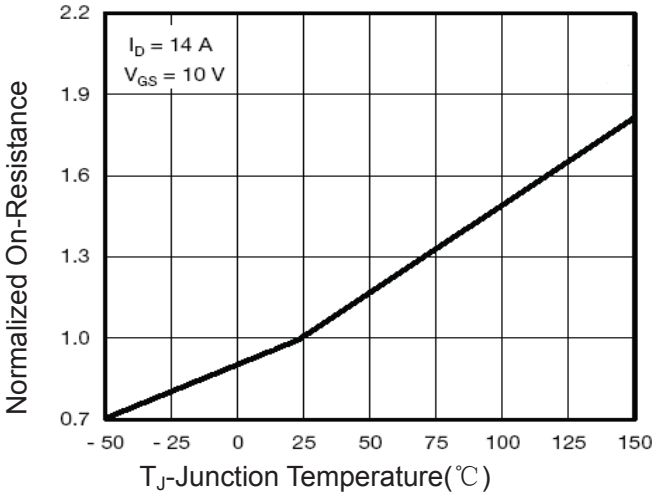


Figure 4 Rdson-Junction Temperature

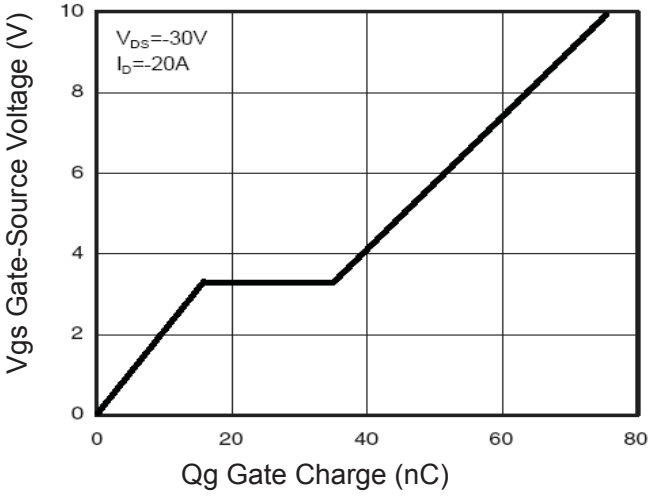


Figure 5 Gate Charge

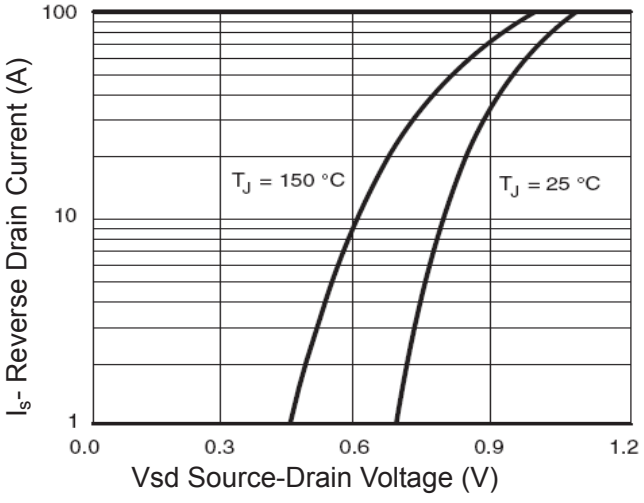


Figure 6 Source- Drain Diode Forward

Characteristics Curve

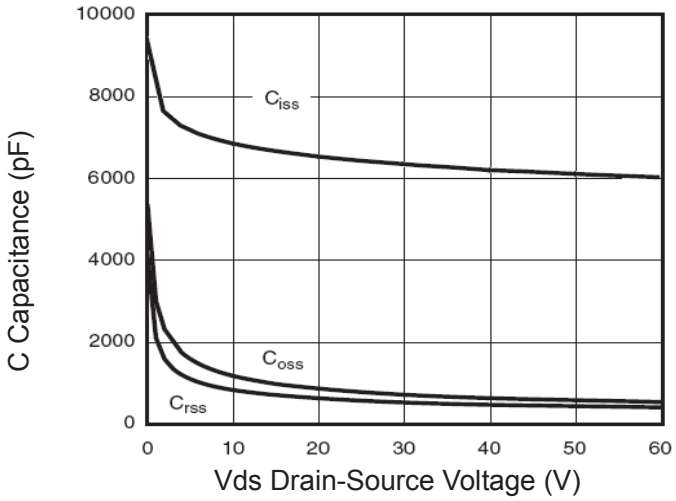


Figure 7 Capacitance vs Vds

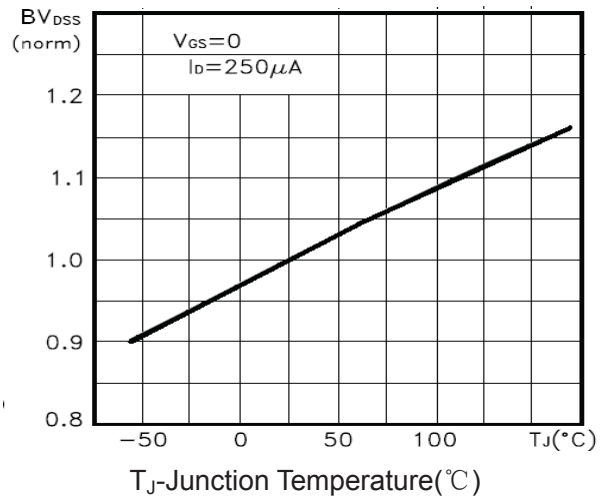


Figure 9 BV_{DSS} vs Junction Temperature

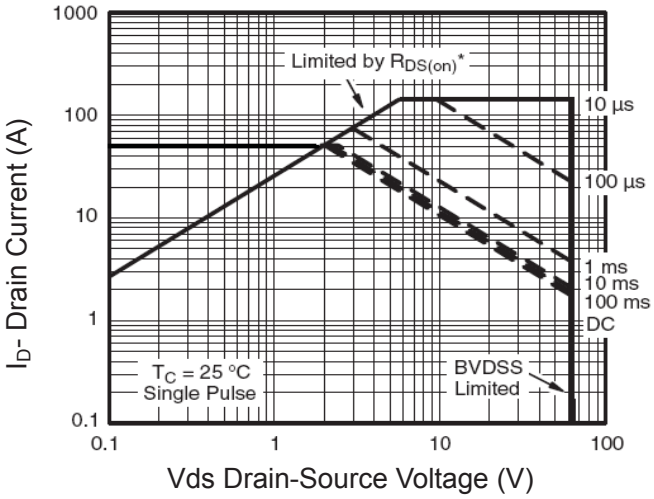


Figure 8 Safe Operation Area

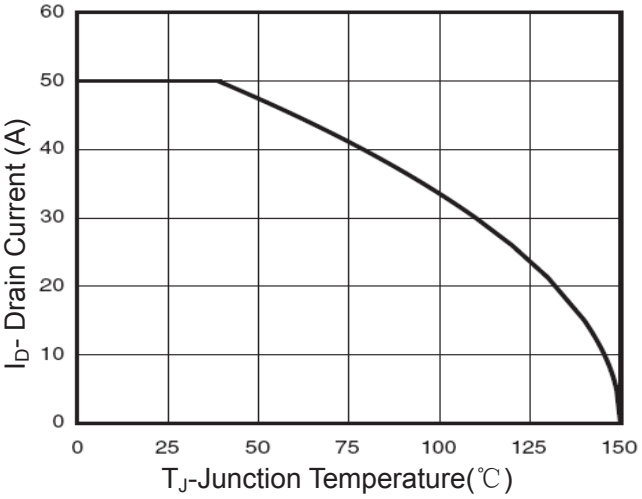


Figure 10 ID Current Derating vs Junction Temperature

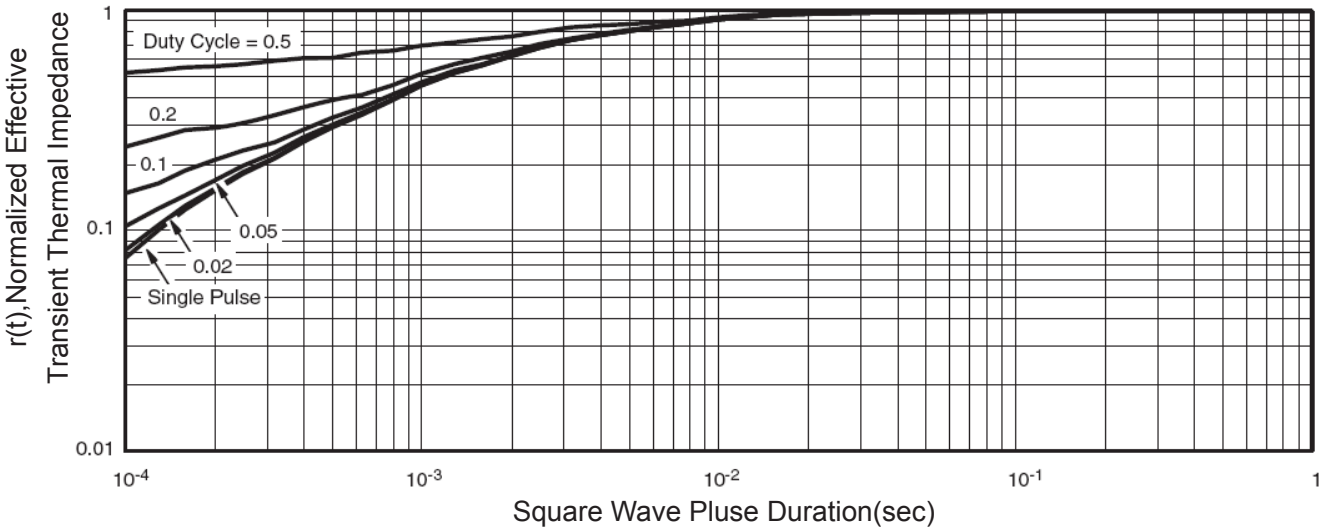


Figure 11 Normalized Maximum Transient Thermal Impedance

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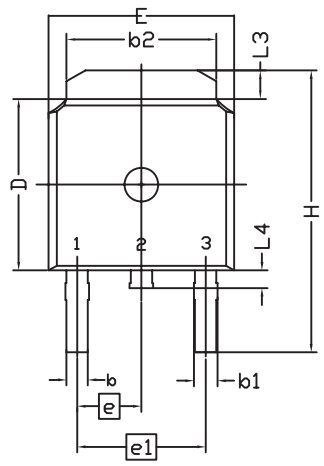
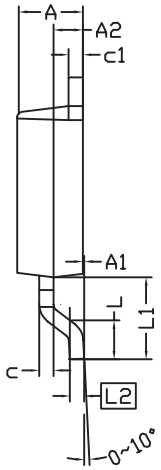
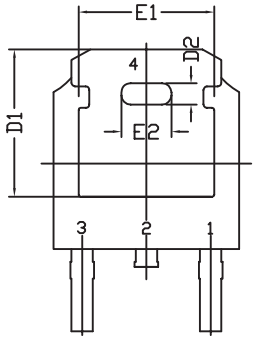
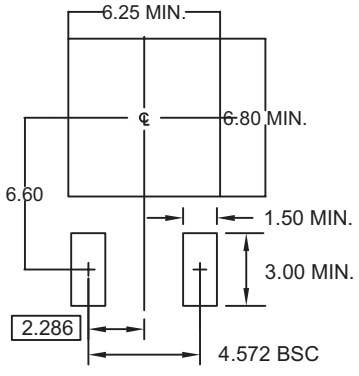
TO252(DPAK) PACKAGE OUTLINE







RECOMMENDED LAND PATTERN



UNIT: mm

SYMBOL	DIMENSION IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	2.184	2.286	2.388	0.086	0.090	0.094
A1	0.000	-----	0.127	0.000	-----	0.005
A2	0.889	1.041	1.143	0.035	0.041	0.045
b	0.635	0.762	0.889	0.025	0.030	0.035
b1	0.762	0.840	1.143	0.030	0.033	0.045
b2	4.953	5.340	5.461	0.195	0.210	0.215
c	0.450	0.508	0.610	0.018	0.020	0.024
c1	0.450	0.508	0.610	0.018	0.020	0.024
D	5.969	6.096	6.223	0.235	0.240	0.245
D1	5.210	5.249	5.380	0.205	0.207	0.212
D2	0.662	0.762	0.862	0.026	0.030	0.034
E	6.350	6.604	6.731	0.250	0.260	0.265
E1	4.318	4.826	4.901	0.170	0.190	0.193
E2	1.678	1.778	1.878	0.066	0.070	0.074
e	2.286 BSC			0.090 BSC		
e1	4.572 BSC			0.180 BSC		
H	9.398	10.033	10.414	0.370	0.395	0.410
L	1.270	1.520	2.032	0.050	0.060	0.080
L1	2.921 REF.			0.115REF.		
L2	0.408	0.508	0.608	0.016	0.020	0.024
L3	0.889	1.016	1.270	0.035	0.040	0.050
L4	0.635	-----	1.016	0.025	-----	0.040

NOTE
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