

MT13G021T

N-Channel Enhancement Mode Field Effect Transistor

Product Summary

- $V_{DS} = 130V$
- $I_D = 380A$
- $R_{DS(ON)} = 2.0 m\Omega @ V_{GS} = 10V$

Features

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

Applications

- Power switching application
- Hard switched and high frequency circuits
- Uninterruptible power supply

Absolute Maximum Ratings ($T_A = 25^\circ C$ unless otherwise noted)

Symbol	Parameter	Steady State	Units
V_{DS}	Drain-Source Voltage	130	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current ¹	380	A
I_{DM}	Pulsed Drain Current ²		
I_S	Continuous Source Current (Diode Conduction) ¹	320	A
E_{AS}	Single Pulse Drain-Source Avalanche Energy ³	2632	mJ
P_D	Maximum Power Dissipation	450	W
T_J, T_{STG}	Operating Junction and Storage Temperature Range	-55~150	$^\circ C$

Notes:

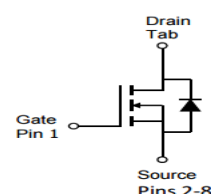
1. Surface Mounted on 1" x 1" FR4 Board, $t \leq 10$ Sec.
2. Pulse width limited by maximum junction temperature.
3. The test condition is $T_J = 25^\circ C$, $V_{DD} = 30V$, $V_{GS} = 10V$, $L = 0.1mH$, $R_G = 25\Omega$, $I_{AS} = 50A$.



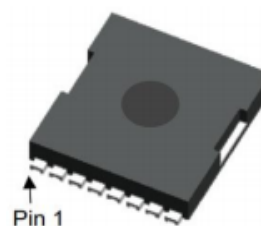
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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.4	$^{\circ}C/W$
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Electrical Characteristics ($T_C=25^{\circ}C$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	130	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=100V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0	2.8	4.0	V
Drain-Source On-State Resistance ^a	$R_{DS(ON)}$	$V_{GS}=10V, I_D=30A$	-	2.0	2.6	m Ω
Dynamic Characteristics^b						
Input Capacitance	C_{iss}	$V_{DS}=50V, V_{GS}=0V,$ $F=1.0MHz$	-	10623	-	PF
Output Capacitance	C_{oss}		-	2149	-	PF
Reverse Transfer Capacitance	C_{rss}		-	79	-	PF
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=50V, I_D=90A$ $V_{GS}=10V, R_G=3.0\Omega$	-	30	-	nS
Turn-on Rise Time	t_r		-	109	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	81	-	nS
Turn-Off Fall Time	t_f		-	109	-	nS
Total Gate Charge	Q_g	$V_{DS}=50V, I_D=90A,$ $V_{GS}=10V$	-	146	-	nC
Gate-Source Charge	Q_{gs}		-	48	-	nC
Gate-Drain Charge	Q_{gd}		-	30	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS}=0V, I_S=30A$	-	0.75	1.4	V
Diode Forward Current	I_S		-	-	380	A
Reverse Recovery Time	t_{rr}	$T_J=25^{\circ}C, I_F=90A$ $di/dt=500A/\mu s$	-	56	-	nS
Reverse Recovery Charge	Q_{rr}		-	96	-	nC
Forward Turn-On Time	t_{on}	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

Note:

a. Pulse test; pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$.

b. Guaranteed by design, not subject to production testing.

Typical Electrical and Thermal Characteristics (Curves)

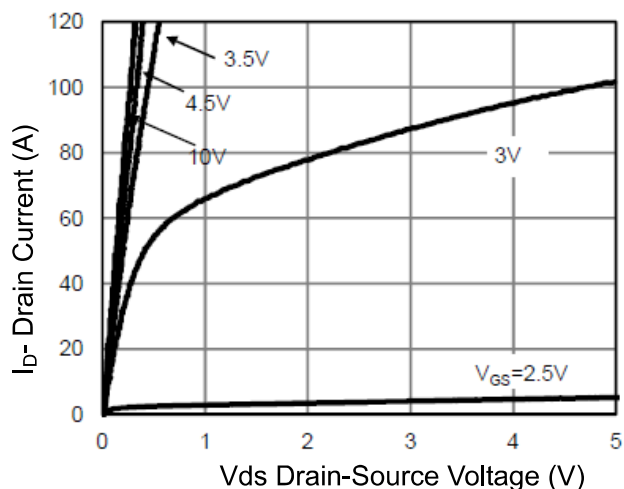


Figure 1 Output Characteristics

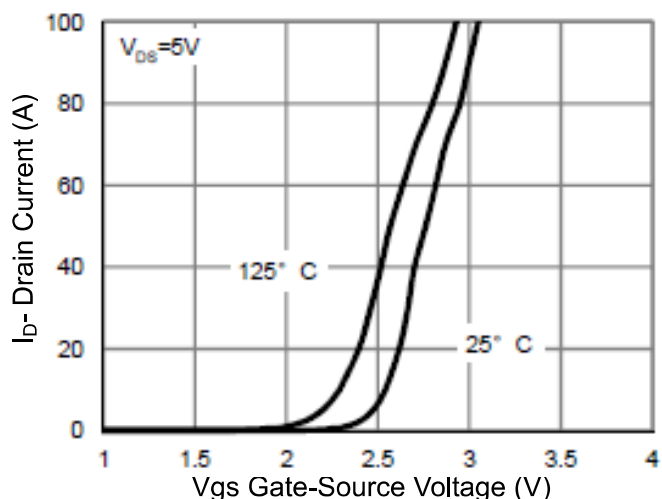


Figure 2 Transfer Characteristics

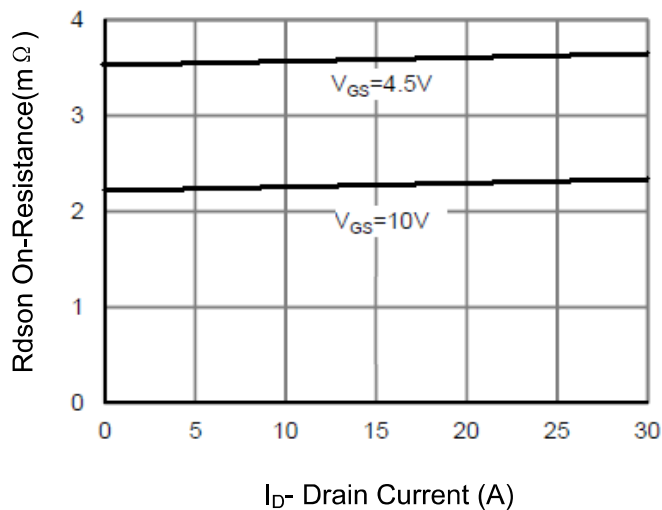


Figure 3 Rdson- Drain Current

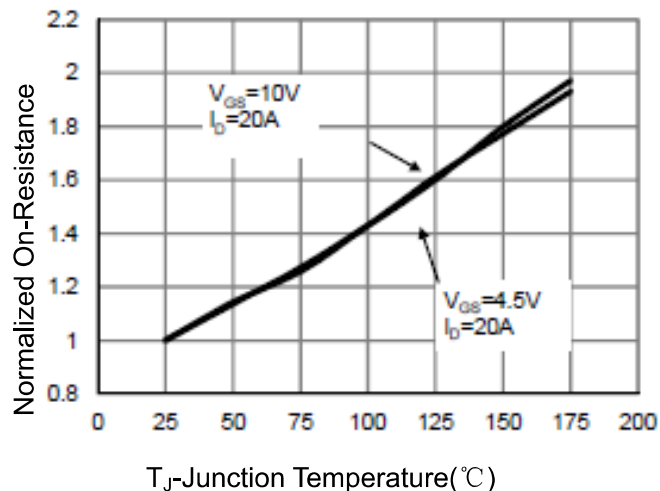


Figure 4 Rdson-Junction Temperature

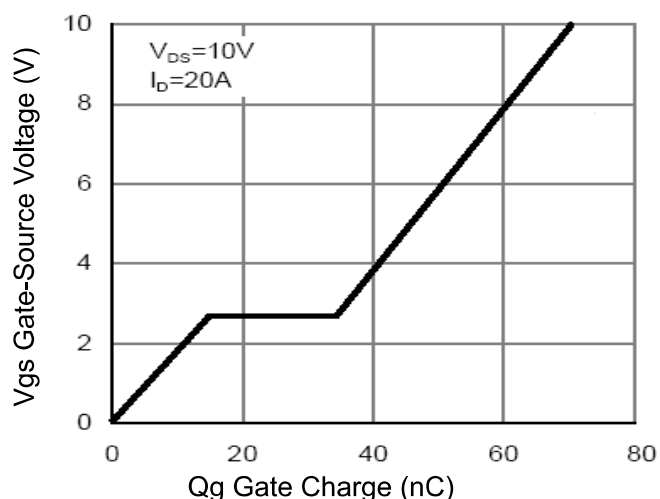


Figure 5 Gate Charge

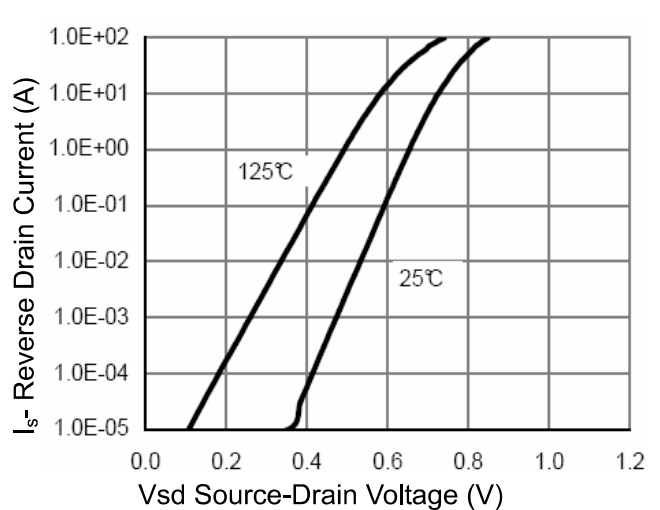


Figure 6 Source- Drain Diode Forward

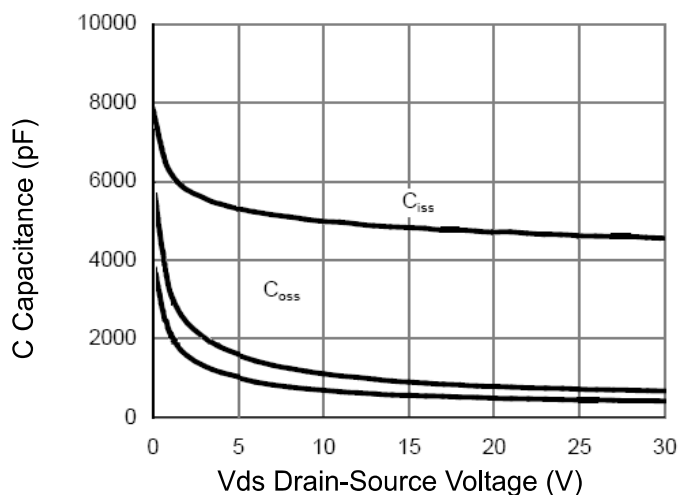


Figure 7 Capacitance vs Vds

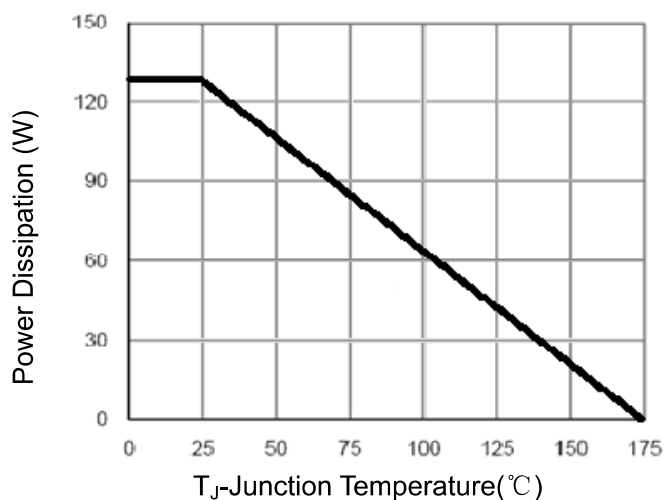


Figure 9 Power De-rating

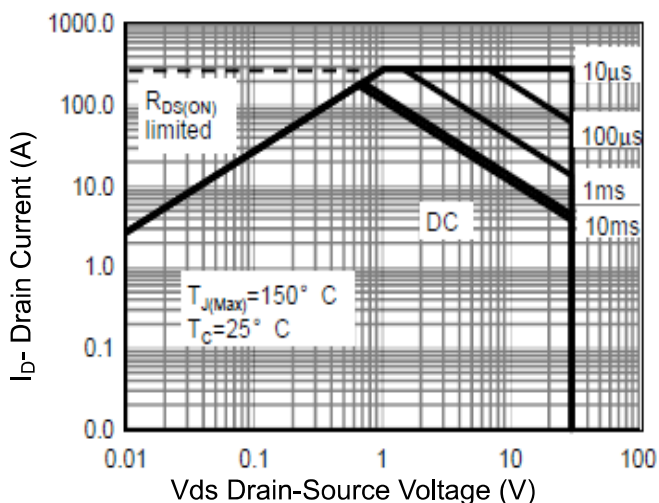


Figure 8 Safe Operation Area

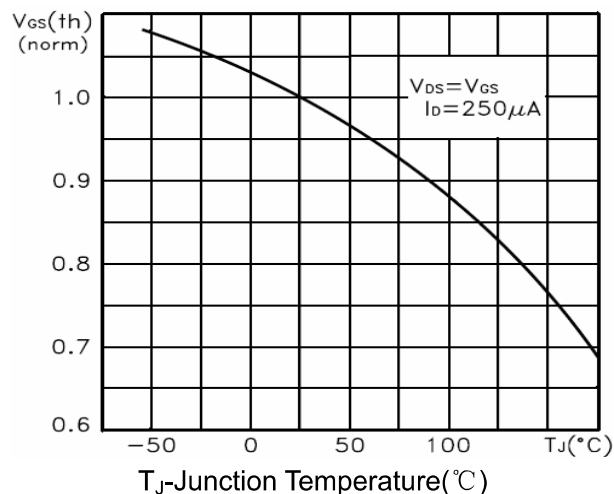


Figure 10 VGS(th) vs Junction Temperature

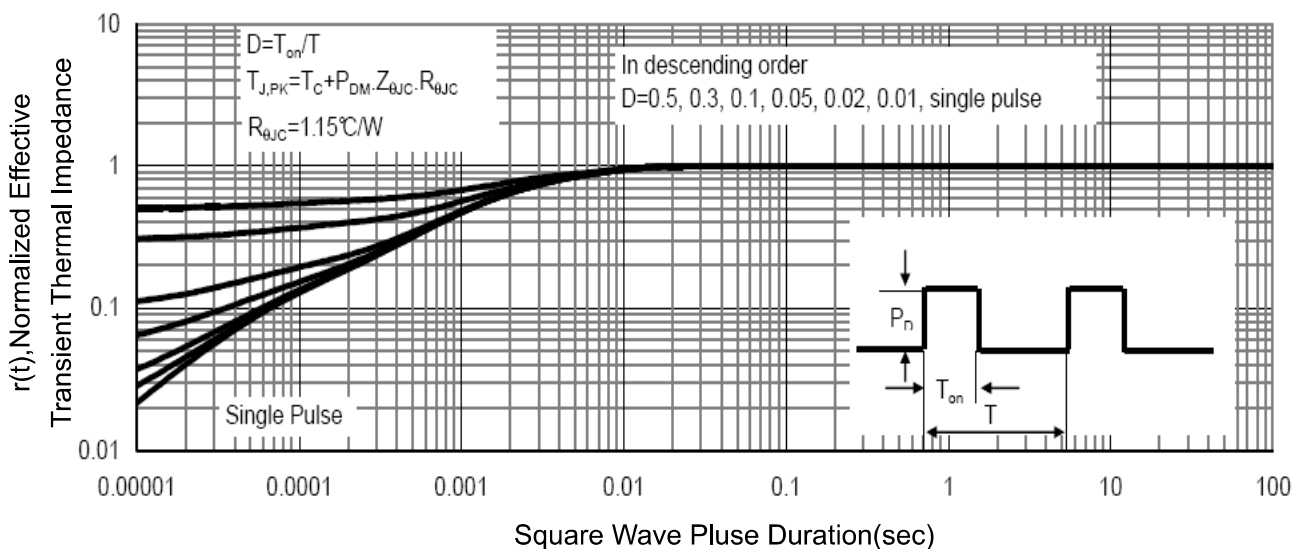
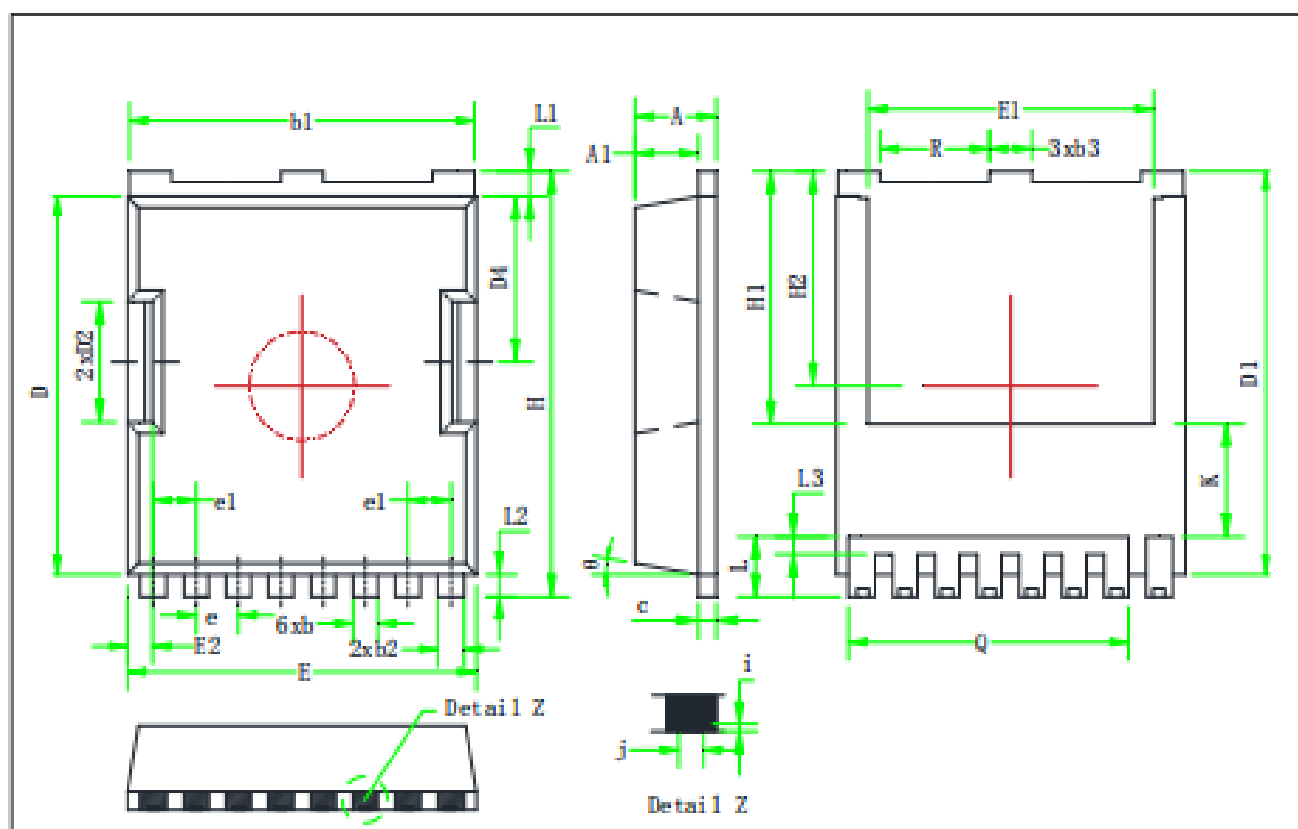


Figure 11 Normalized Maximum Transient Thermal Impedance

Package Mechanical Data(TOLL)



Symbol	Min	Typ	Max	Symbol	Min	Typ	Max
A	2.25	2.30	2.35	E2	0.65	0.70	0.75
A1	1.75	1.80	1.85	H	11.60	11.70	11.80
b	0.65	0.70	0.75	H1	6.95 BSC		
b_1	9.75	9.80	9.85	H2	5.90 BSC		
b_2	0.70	0.75	0.80	i	0.10 REF		
b_3	1.15	1.20	1.25	j	0.35 REF		
c	0.45	0.50	0.55	K	3.10 REF		
D	10.35	10.40	10.45	L	1.55	1.65	1.75
D1	11.00	11.10	11.20	L1	0.65	0.70	0.75
D2	3.25	3.30	3.35	L2	0.50	0.60	0.70
D4	4.50	4.55	4.60	L3	0.40	0.50	0.60
e	1.20 BSC			Q	7.95 REF		
e_1	1.225 BSC			R	3.05	3.10	3.15
E	9.85	9.90	9.95	θ	10° REF		
E1	8.00	8.10	8.20				

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