

MT04G22N5

N-Channel Enhancement Mode Field Effect Transistor

Product Summary

- $V_{DS} = 40V$
- $I_D = 150A$
- $R_{DS(ON)} = 2.2 m\Omega @ V_{GS} = 10V$
- $R_{DS(ON)} = 3.5 m\Omega @ V_{GS} = 4.5V$

Features

- Advanced Trench Process Technology.
- High Density Cell Design for Ultra Low On-Resistance.
- Lead free product is acquired.
- RoHS Compliant.
- PDFN5x6-8L 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		40	V
V _{GS}	Gate-Source Voltage		± 20	V
I _D	Continuous Drain Current ¹	T _C = 25°C	150	A
I _{DM}	Pulsed Drain Current ²		360	A
I _S	Continuous Source Current (Diode Conduction) ¹		150	A
E _{AS}	Single Pulse Drain-Source Avalanche Energy ³		220	mJ
P _D	Maximum Power Dissipation	T _C = 25°C	110	W
T _J , T _{STG}	Operating Junction and Storage Temperature Range		-55~150	°C

Notes:

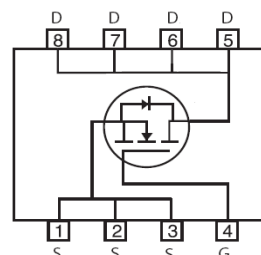
1. Surface Mounted on 1" x 1" FR4 Board, $t \leq 10$ Sec.
2. Pulse width limited by maximum junction temperature.
3. The test condition is $T_J = 25^\circ C$, $V_{DD} = 30V$, $V_{GS} = 10V$, $L = 0.1mH$, $R_G = 25\Omega$, $I_{AS} = 50A$.



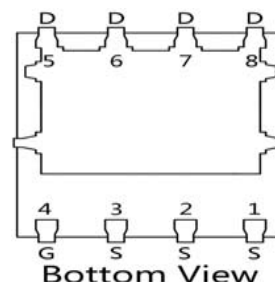
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Simplified Schematic



MARKING DIAGRAM & PIN ASSIGNMENT



Thermal Characteristic

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	1.15	$^{\circ}\text{C/W}$
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Electrical Characteristics ($T_C=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V I _D =250μA	40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =24V, V _{GS} =0V	-	-	1	uA
Gate-Body Leakage Current	I _{GSS}	V _{GS} =±12V, V _{DS} =0V	-	-	100	nA
On Characteristics						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1.0	1.8	2.3	V
Drain-Source On-State Resistance ^a	R _{DS(ON)}	V _{GS} =4.5V, I _D =20A	-	3.5	4	mΩ
		V _{GS} =10V, I _D =15A	-	2.2	2.5	
Forward Transconductance	g _{FS}	V _{DS} =5V, I _D =20A	100	-	-	S
Dynamic Characteristics ^b						
Input Capacitance	C _{iss}	V _{DS} =10V, V _{GS} =0V, F=1.0MHz	-	2776	-	PF
Output Capacitance	C _{Oss}		-	1400	-	PF
Reverse Transfer Capacitance	C _{rss}		-	410	-	PF
Switching Characteristics						
Turn-on Delay Time	t _{d(on)}	V _{DD} =10V, I _D =2A, R _L =15Ω V _{GS} =10V, R _G =2.5Ω	-	12	-	nS
Turn-on Rise Time	t _r		-	10	-	nS
Turn-Off Delay Time	t _{d(off)}		-	45	-	nS
Turn-Off Fall Time	t _f		-	22	-	nS
Total Gate Charge	Q _g	V _{DS} =10V, I _D =20A, V _{GS} =10V	-	70		nC
Gate-Source Charge	Q _{gs}		-	16		nC
Gate-Drain Charge	Q _{gd}		-	20		nC
Drain-Source Diode Characteristics						
Diode Forward Voltage	V _{SD}	V _{GS} =0V, I _S =20A	-	0.75	1	V
Diode Forward Current	I _S		-	-	150	A
Reverse Recovery Time	t _{rr}	T _J = 25°C, I _F = 20A di/dt = 500A/μs	-	33	-	nS
Reverse Recovery Charge	Q _{rr}		-	18	-	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)

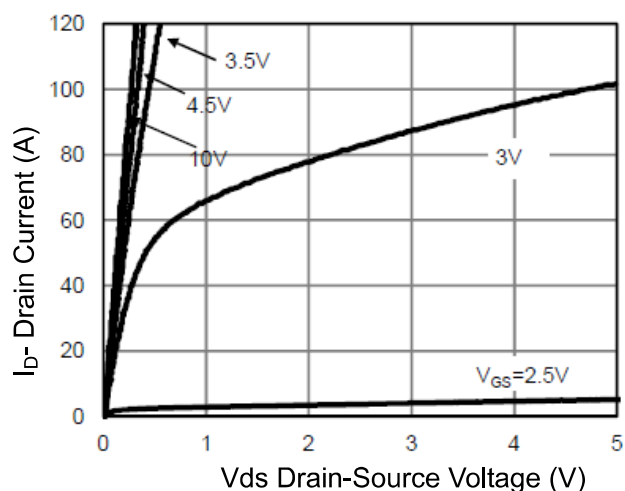


Figure 1 Output Characteristics

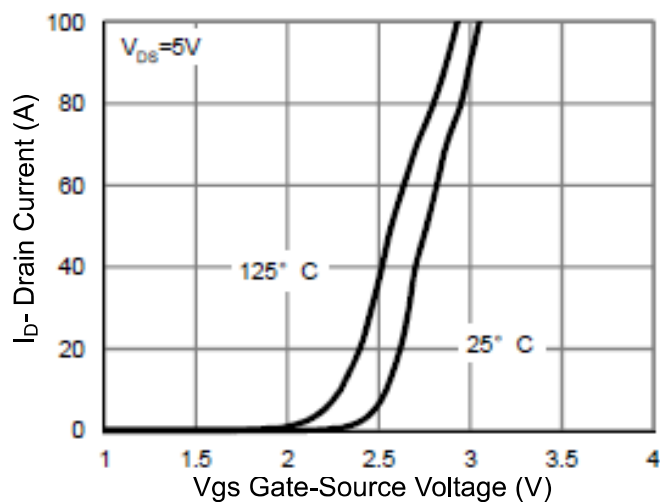


Figure 2 Transfer Characteristics

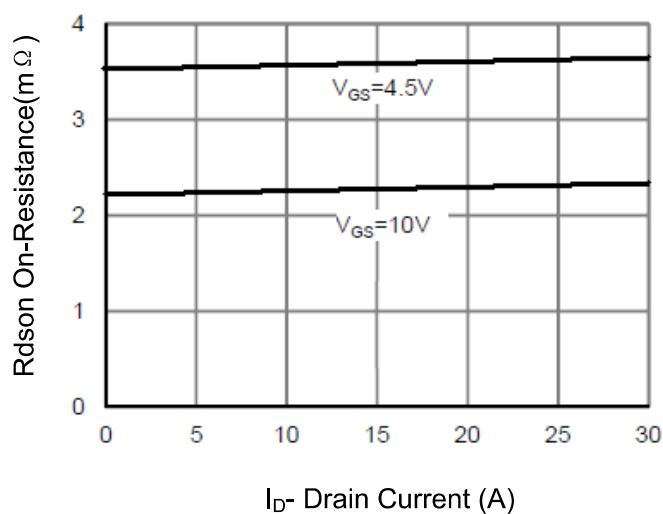


Figure 3 $R_{DS(on)}$ - Drain Current

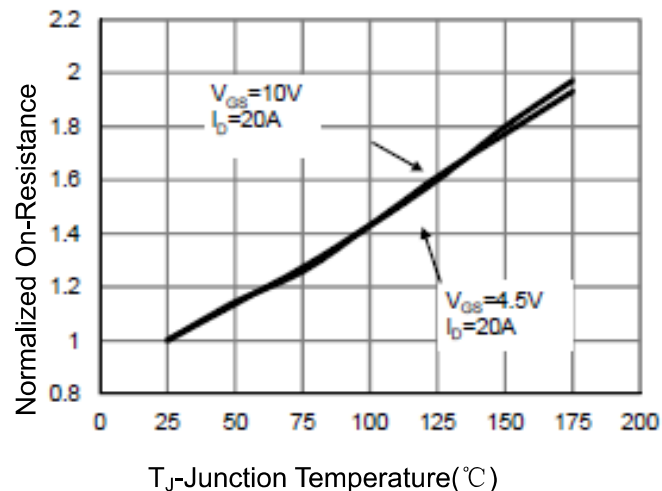


Figure 4 $R_{DS(on)}$ - Junction Temperature

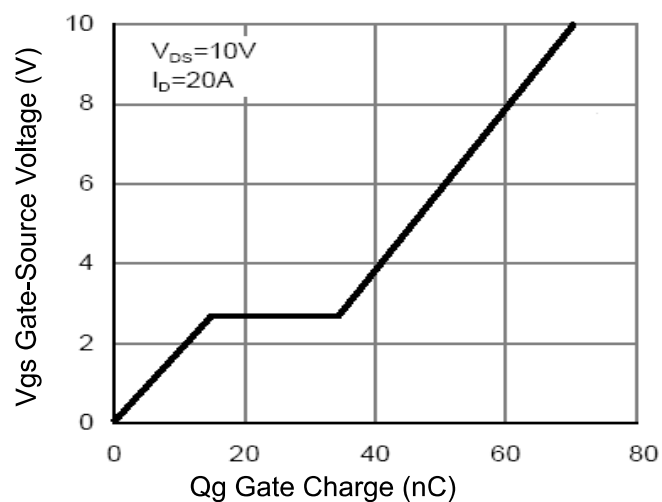


Figure 5 Gate Charge

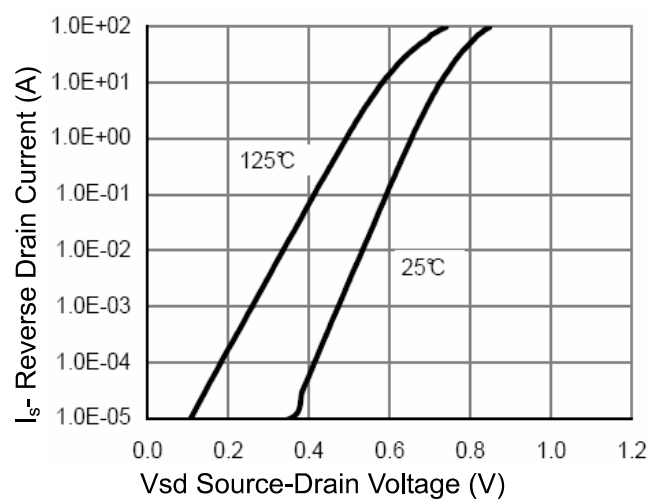


Figure 6 Source- Drain Diode Forward

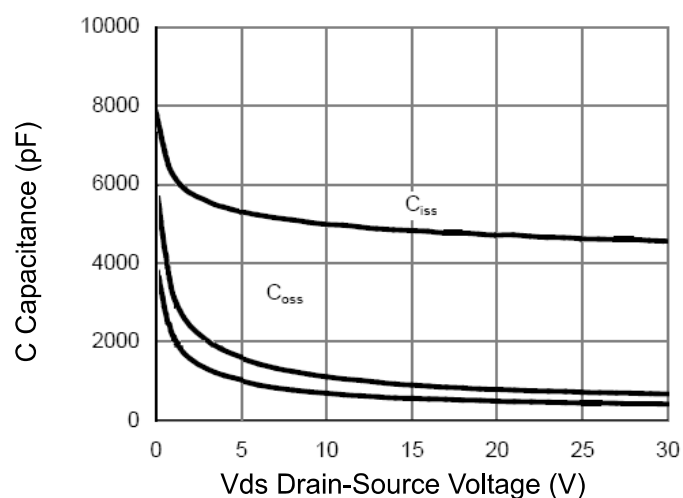


Figure 7 Capacitance vs Vds

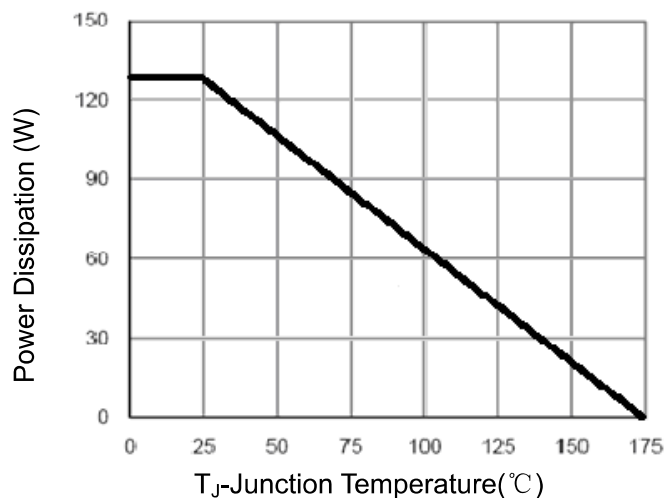


Figure 9 Power De-rating

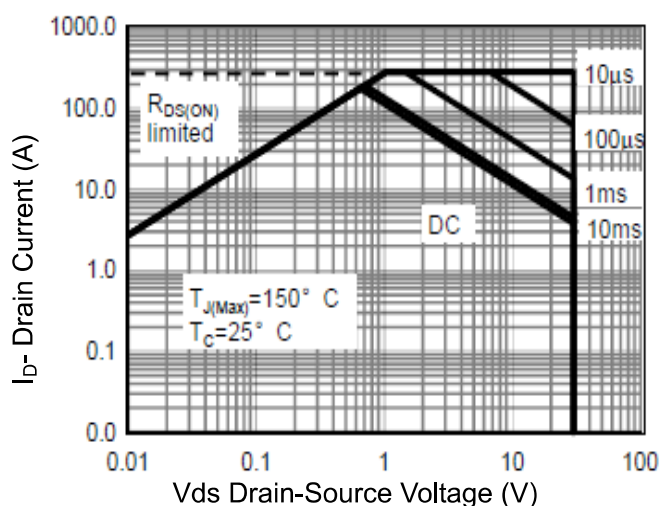


Figure 8 Safe Operation Area

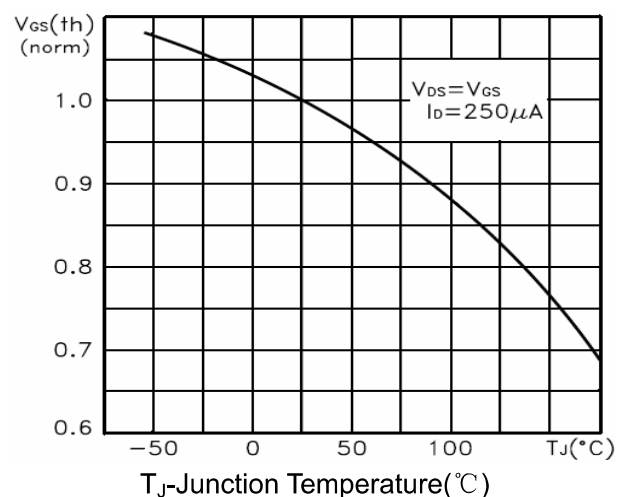
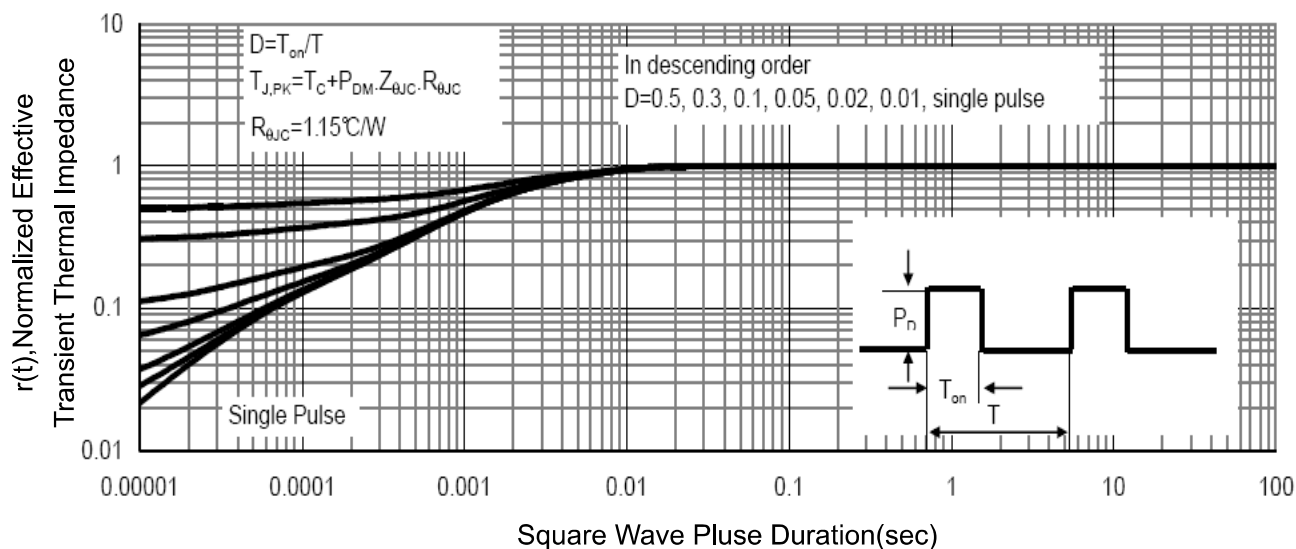
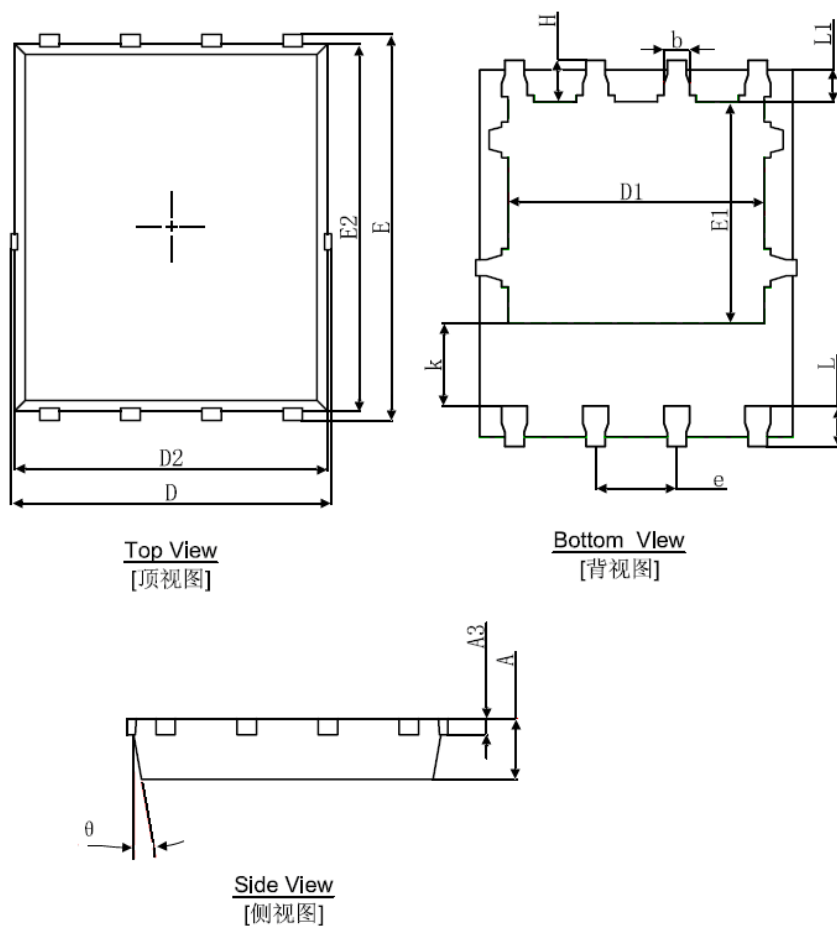
Figure 10 $V_{GS(th)}$ vs Junction Temperature

Figure 11 Normalized Maximum Transient Thermal Impedance

PDFN5X6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.000	0.035	0.039
A3	0.254REF.		0.010REF.	
D	4.944	5.096	0.195	0.201
E	5.974	6.126	0.235	0.241
D1	3.910	4.110	0.154	0.162
E1	3.375	3.575	0.133	0.141
D2	4.824	4.976	0.190	0.196
E2	5.674	5.826	0.223	0.229
K	1.190	1.390	0.047	0.055
b	0.035	0.450	0.014	0.018
e	1.270(TYP.)		0.050(TYP.)	
L	0.559	0.711	0.022	0.028
L1	0.424	0.576	0.017	0.023
H	0.574	0.726	0.023	0.029
θ	8°	12°	8°	12°

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