AT020SP040MPT

P-Channel Enhancement Mode MOSFET

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_D
-40V	40mΩ@-10V	-20A
	60mΩ@-4.5V	

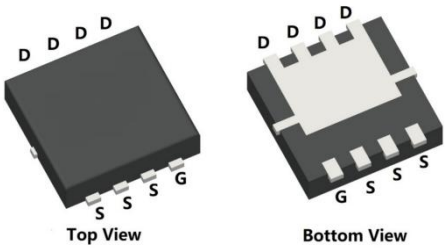
Feature

- Advanced trench technology
- Excellent $R_{DS(ON)}$
- Low gate charge

Application

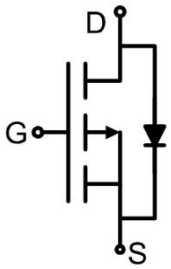
- Battery protection
- Load switch
- Uninterruptible power supply

Package

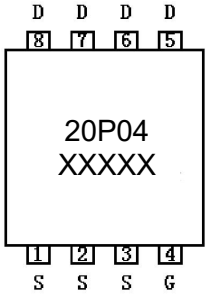


PDFN3.3*3.3-8L

Circuit diagram



Marking



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Absolute maximum ratings (T_C=25℃ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current[1] (V_{GS} =-10V)	I_D	-20	A
Continuous Drain Current[1] (V_{GS} =-10V,T_C=100℃)	I_D (100℃)	-18	A
Pulsed Drain Current[2]	I_{DM}	-60	A
Single Pulse Avalanche Energy[3]	E_{AS}	37	mJ
Power Dissipation[4]	P_D	31.3	W
Thermal Resistance Junction-to-Case[1]	$R_{\theta JC}$	4	℃/W
Operating Junction Temperature	T_J	-55 ~ +150	℃
Storage Temperature	T_{STG}	-55 ~ +150	℃

Electrical characteristics (T_J=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	V_{GS} =0V, I_D =-250μA	-40			V
Zero gate voltage drain current	I_{DSS}	V_{DS} =-32V, V_{GS} =0V			-1	μA
Gate-body leakage current	I_{GSS}	V_{DS} =0V, V_{GS} =±20V			±100	nA
Gate threshold voltage	$V_{GS(th)}$	V_{DS} =V_{GS}, I_D =-250μA	-1	-1.6	-2.5	V
Drain-source on-resistance[2]	$R_{DS(on)}$	V_{GS} =-10V, I_D =-18A		30	40	mΩ
		V_{GS} =-4.5V, I_D =-12A		45	60	
Dynamic characteristics[6]						
Input Capacitance	C_{iss}	V_{DS} =-15V, V_{GS} =0V, f =1MHz		1004		pF
Output Capacitance	C_{oss}			108		
Reverse Transfer Capacitance	C_{rss}			80		
Total Gate Charge	Q_g	V_{DS} =-20V, V_{GS} =-4.5V I_D =-12A		9		nC
Gate-Source Charge	Q_{gs}			2.54		
Gate-Drain Charge	Q_{gd}			3.1		
Turn-on delay time	$t_{d(on)}$	V_{DS} =-15V, V_{GS} =-10V I_D =-1A, R_G =3.3Ω		19.2		nS
Turn-on rise time	t_r			12.8		
Turn-off delay time	$t_{d(off)}$			48.6		
Turn-off fall time	t_f			4.6		
Source-Drain Diode characteristics						
Diode Forward Current[1,5]	I_S	V_D =V_G =0V, Force Current			-20	A
Diode Forward voltage[2]	V_{SD}	V_{GS} =0V, I_S =-1A			-1	V

Notes:

1) The data tested by surface mounted on a 1 inch² FR-4 board with 2OZ copper.

2) The data tested by pulsed , pulse width ≤300us , duty cycle ≤2%.

3) The EAS data shows Max. rating . The test condition is V_{DD} =-25V,V_{GS} =-10V,L=0.1mH,I_{AS} =-27.2A.

4) The power dissipation is limited by 150℃ junction temperature.

5) The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation.

6) Guaranteed by design, not subject to production testing.

Typical Characteristics

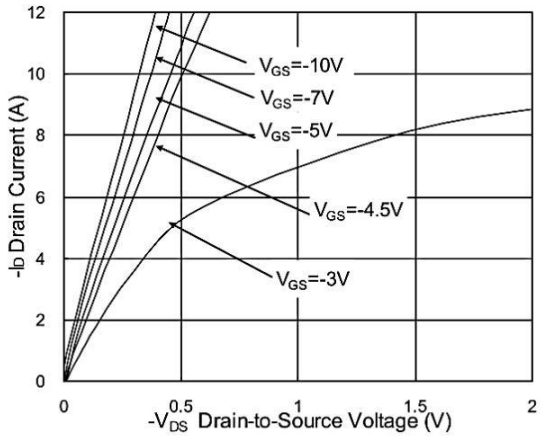


Fig.1 Typical Output Characteristics

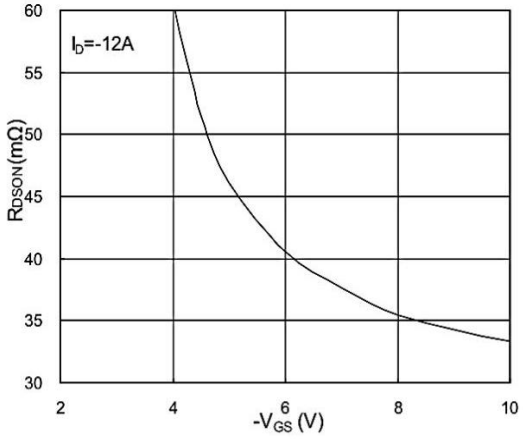


Fig.2 On-Resistance v.s Gate-Source

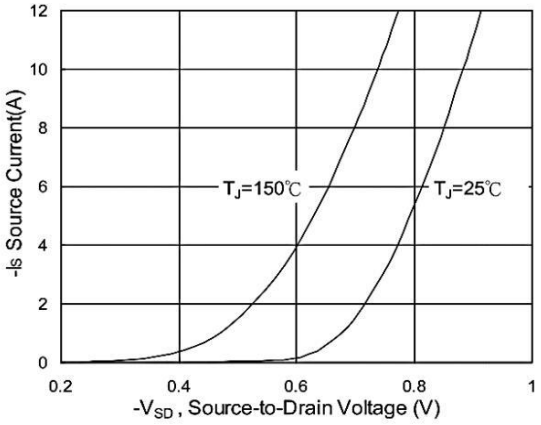


Fig.3 Forward Characteristics of Reverse

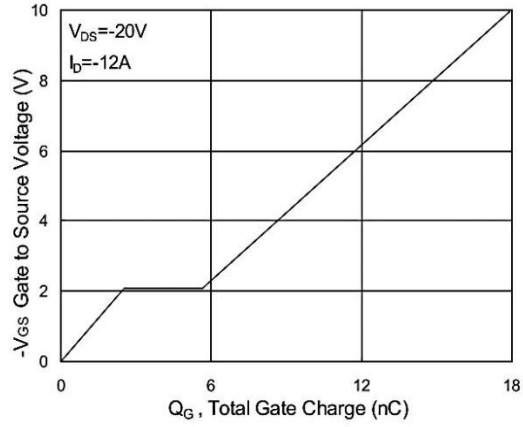


Fig.4 Gate-Charge Characteristics

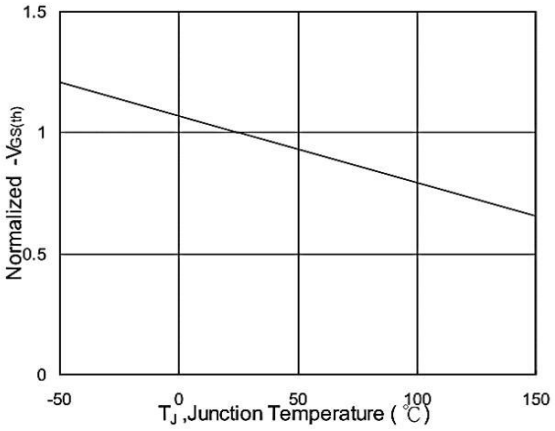


Fig.5 Normalized $V_{GS(th)}$ v.s T_J

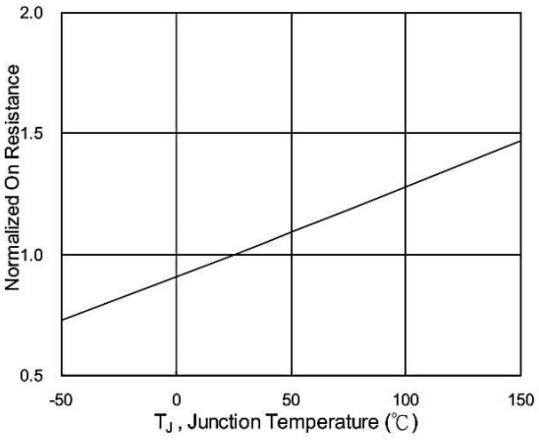


Fig.6 Normalized R_{DSON} v.s T_J

Typical Characteristics

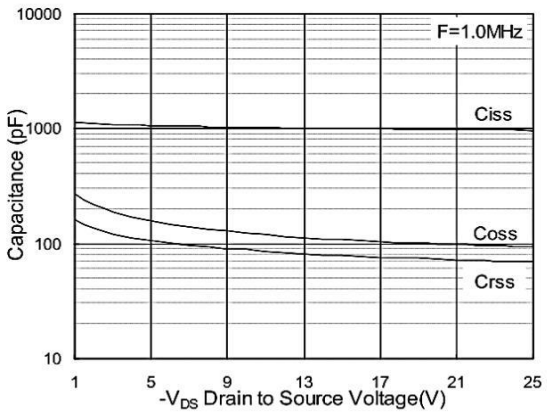


Fig.7 Capacitance

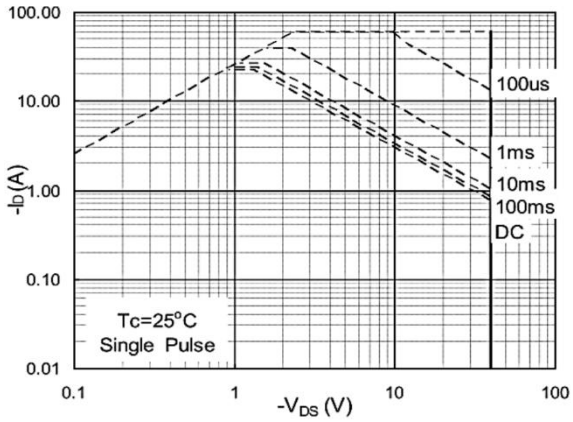


Fig.8 Safe Operating Area

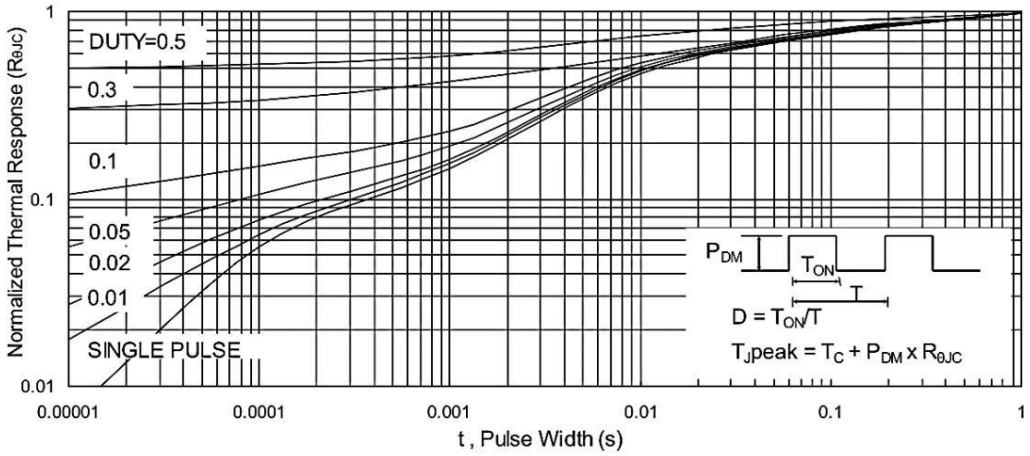


Fig.9 Normalized Maximum Transient Thermal Impedance

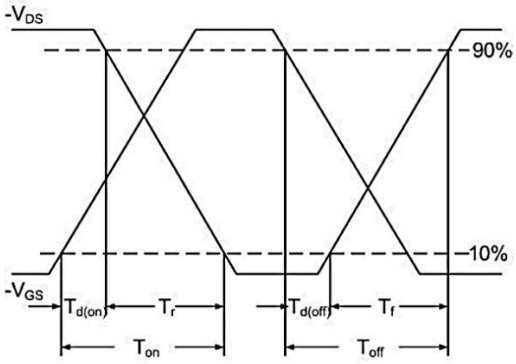


Fig.10 Switching Time Waveform

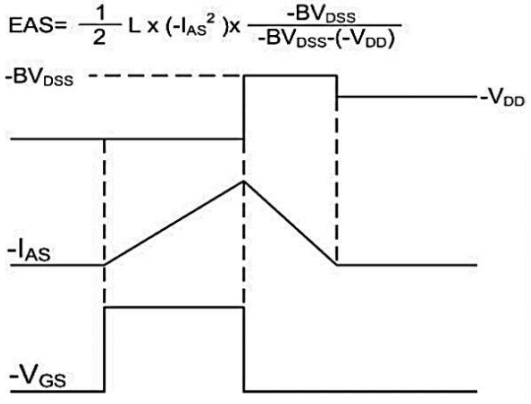
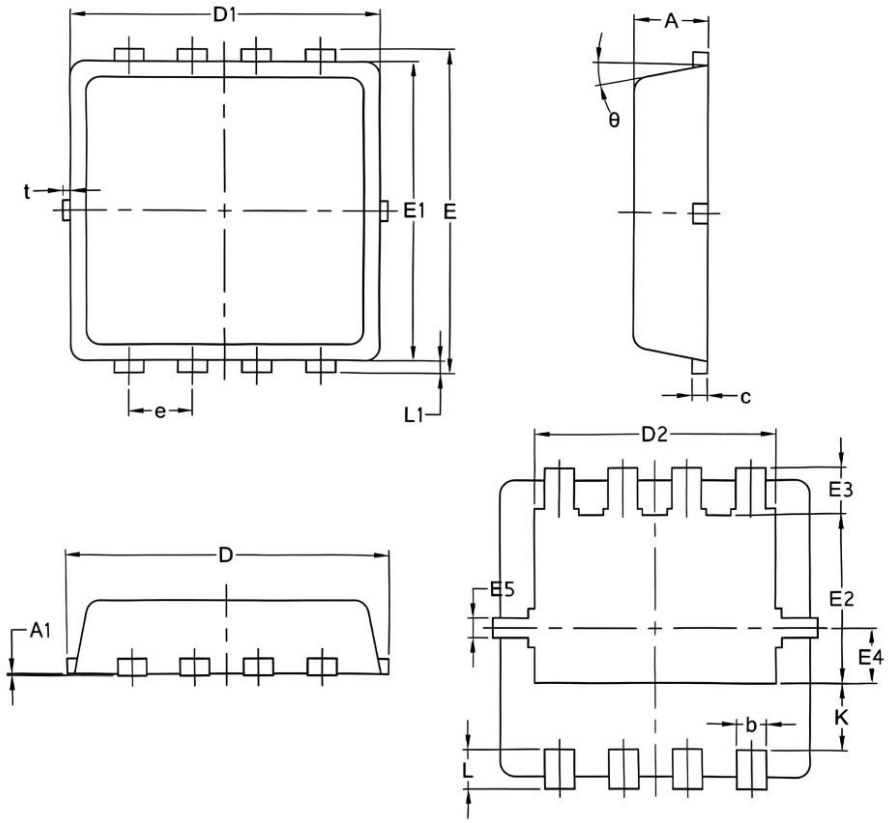


Fig.11 Unclamped Inductive Waveform

PDFN3.3*3.3-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.850	0.028	0.033
A1	-	0.050	-	0.002
b	0.200	0.400	0.008	0.016
c	0.100	0.250	0.004	0.010
D	3.150	3.450	0.124	0.136
D1	3.000	3.250	0.118	0.128
D2	2.290	2.650	0.090	0.104
E	3.150	3.450	0.124	0.136
E1	2.900	3.200	0.114	0.126
E2	1.540	1.940	0.061	0.076
E3	0.280	0.650	0.011	0.026
E4	0.370	0.770	0.015	0.030
E5	0.100	0.300	0.004	0.012
e	0.600	0.700	0.024	0.028
K	0.590	0.890	0.023	0.035
L	0.300	0.500	0.012	0.020
L1	0.060	0.200	0.002	0.008
t	0.000	0.130	0.000	0.005
θ	10°	14°	10°	14°