

Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	I_b
40V	7.5mΩ@10V	46A
	12mΩ@4.5V	

Feature

- Low $R_{DS(ON)}$
- Suffix “-Q1” for AEC-Q101

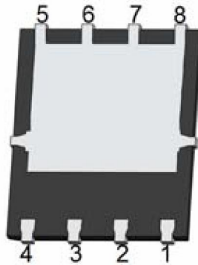
Application

- Motor / Body load control

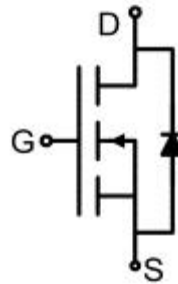
Package



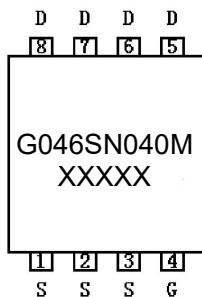
PDFN5*6-8L



Circuit diagram



Marking



Absolute maximum ratings ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ($T_C=25^{\circ}\text{C}$)	I_D	46	A
Continuous Drain Current ($T_C=100^{\circ}\text{C}$)	$I_D(100^{\circ}\text{C})$	32	A
Pulsed Drain Current ¹⁾	I_{DM}	160	A
Single Pulse Avalanche Energy ²⁾	E_{AS}	36	mJ
Power Dissipation ($T_C=25^{\circ}\text{C}$)	P_D	30	W
Thermal Resistance Junction to Case	$R_{\theta JC}$	5	$^{\circ}\text{C}/\text{W}$
Operating Junction Temperature	T_J	-55 ~ +175	$^{\circ}\text{C}$
Storage Temperature Range	T_{STG}	-55 ~ +175	$^{\circ}\text{C}$

Electrical characteristics ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
Drain-source breakdown voltage	$V_{(BR)DSS}$	$V_{GS}=0\text{V}, I_D=250\mu\text{A}$	40			V
Zero gate voltage drain current	I_{DSS}	$V_{DS}=40\text{V}, V_{GS}=0\text{V}$			1	μA
Gate-body leakage current	I_{GSS}	$V_{DS}=0\text{V}, V_{GS}=\pm 20\text{V}$			± 100	nA
Gate threshold voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu\text{A}$	1	1.45	2.5	V
Drain-source on-resistance	$R_{DS(on)}$	$V_{GS}=10\text{V}, I_D=12\text{A}$		6.4	7.5	m Ω
		$V_{GS}=4.5\text{V}, I_D=10\text{A}$		9	12	
Dynamic characteristics³⁾						
Input Capacitance	C_{iss}	$V_{DS}=20\text{V}, V_{GS}=0\text{V}, f=1\text{MHz}$		638		pF
Output Capacitance	C_{oss}			326		
Reverse Transfer Capacitance	C_{rss}			8		
Total Gate Charge	Q_g	$V_{DS}=20\text{V}, V_{GS}=10\text{V}, I_D=12\text{A}$		12		nC
Gate-Source Charge	Q_{gs}			2		
Gate-Drain Charge	Q_{gd}			2		
Turn-on delay time	$t_{d(on)}$	$V_{DS}=20\text{V}, V_{GS}=10\text{V}, I_D=12\text{A}$ $R_G=3.3\Omega$		8		nS
Turn-on rise time	t_r			9		
Turn-off delay time	$t_{d(off)}$			8		
Turn-off fall time	t_f			1.5		
Source-Drain Diode characteristics						
Diode Forward Current	I_S				46	A
Diode Forward voltage ²⁾	V_{SD}	$V_{GS}=0\text{V}, I_S=1\text{A}$			1.2	V
Reverse Recovery Time	T_{rr}	$I_S=12\text{A}, di/dt=-100\text{A}/\mu\text{s}$		20		nS
Reverse Recovery Charge	Q_{rr}			8		nC

Notes:

- 1) Pulse Test: Pulse Width $\leq 100\mu\text{s}$, Duty Cycle $\leq 2\%$, Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)} = 175^{\circ}\text{C}$.
- 2) Limited by $T_{J(MAX)}$, starting $T_J=25^{\circ}\text{C}$, $L=0.5\text{mH}$, $R_G=25\Omega$, $I_{AS}=12\text{A}$, $V_{GS}=10\text{V}$.
- 3) Guaranteed by design, not subject to production.

Typical Characteristics

Fig. 1 Typical Output Characteristics

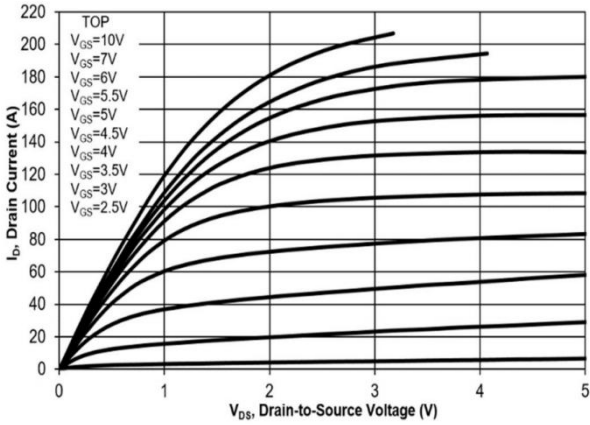


Fig. 2 Typical Transfer Characteristics

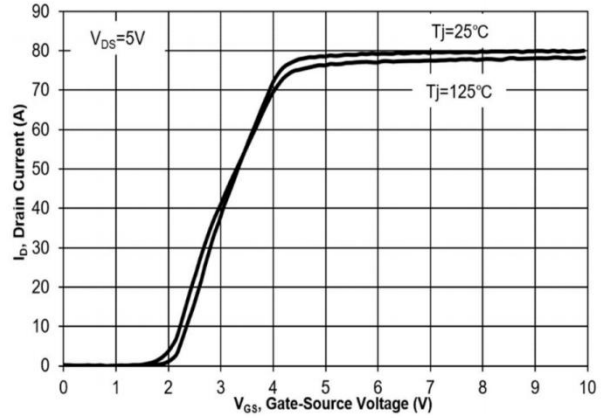


Fig. 3 On-Resistance vs. Drain Current

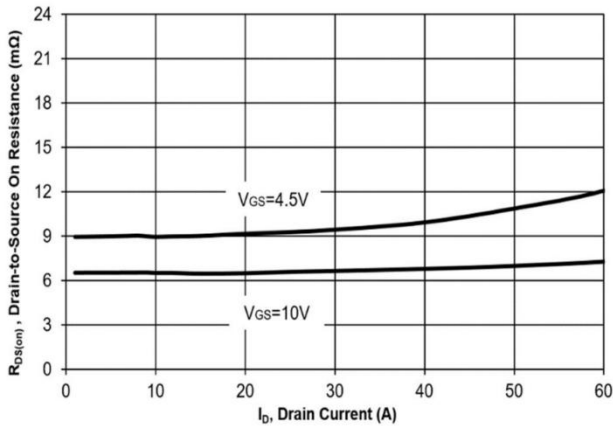


Fig. 4 On-Resistance vs. Gate to Source Voltage

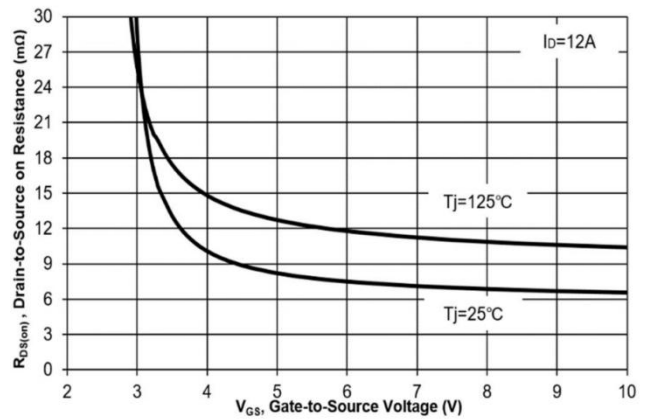


Fig. 5 On-Resistance vs. T_J

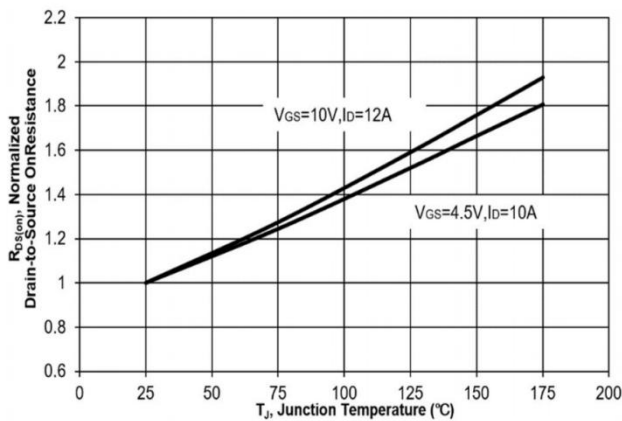
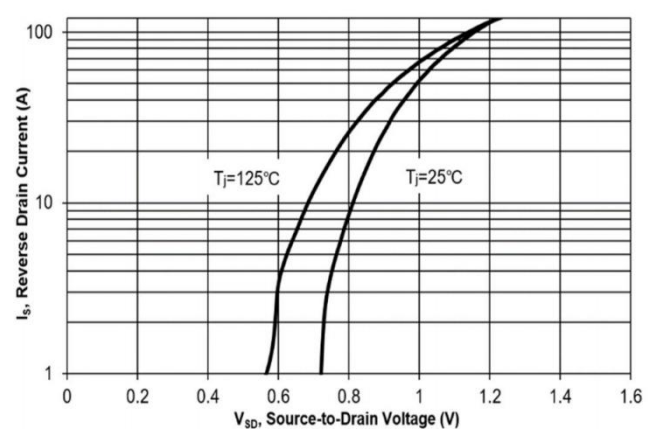


Fig. 6 Typical Body-Diode Forward Characteristics



Typical Characteristics

Fig. 7 Typical Junction Capacitance

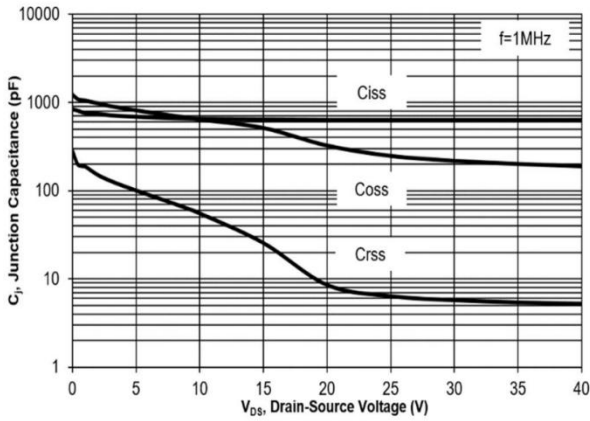


Fig. 8 Drain-Source Leakage Current vs. Tj

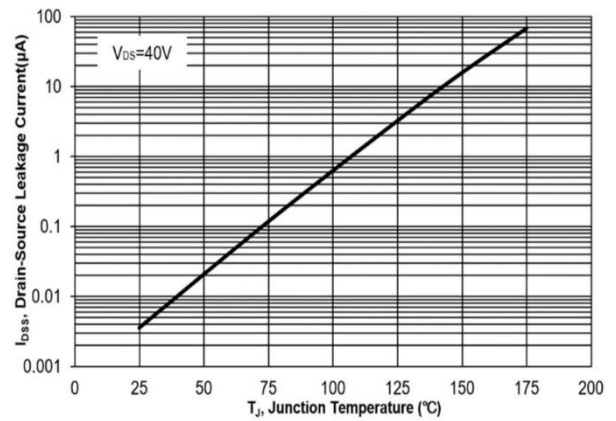


Fig. 9 V(BR)DSS vs. Junction Temperature

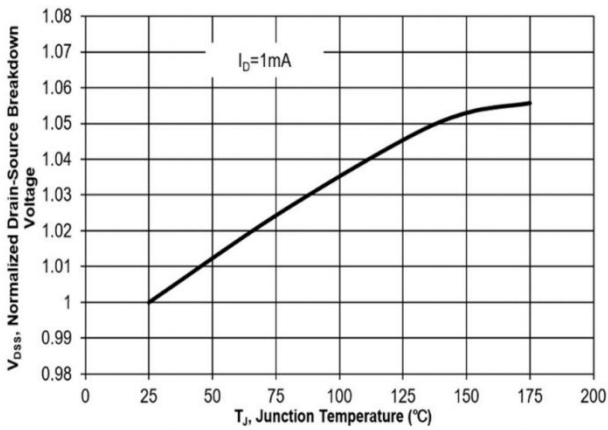


Fig. 10 Gate Threshold Variation vs. Tj

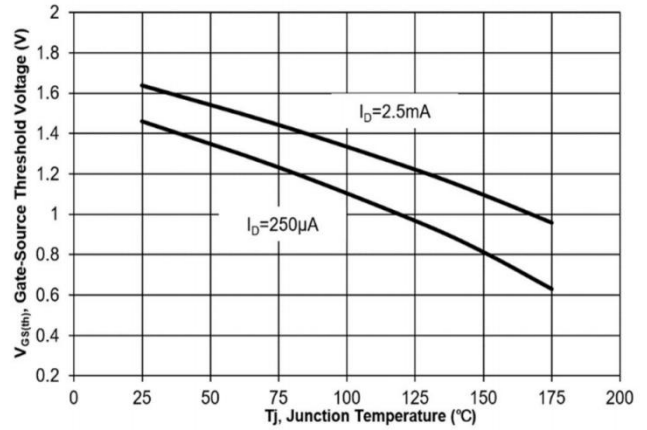


Fig. 11 Gate Charge

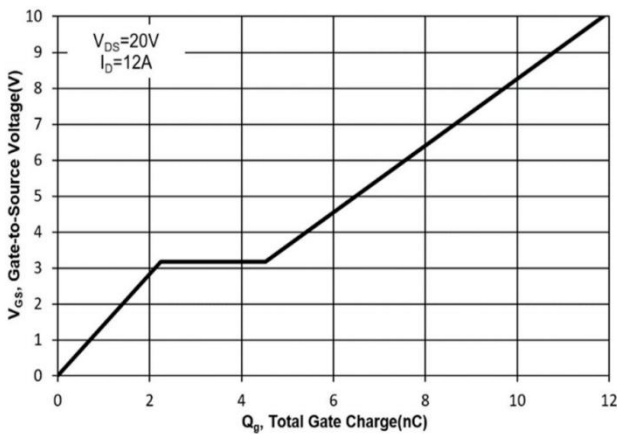
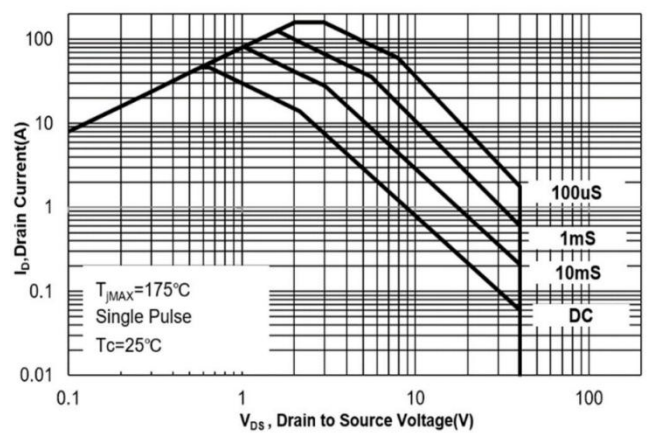


Fig. 12 Safe Operation Area



Typical Characteristics

Fig.13 Normalized Maximum Transient Thermal Impedance($Z_{\theta JC}$)

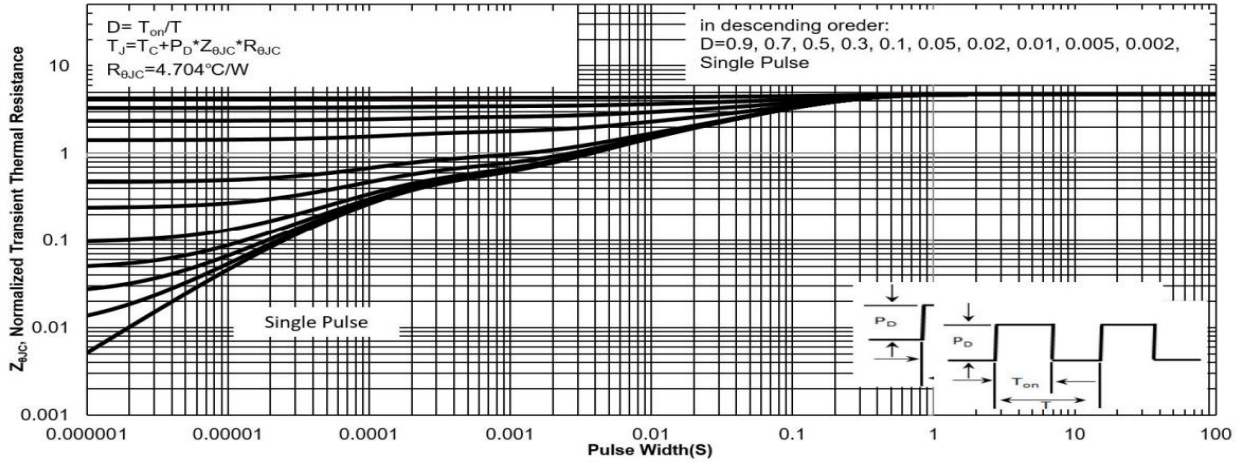
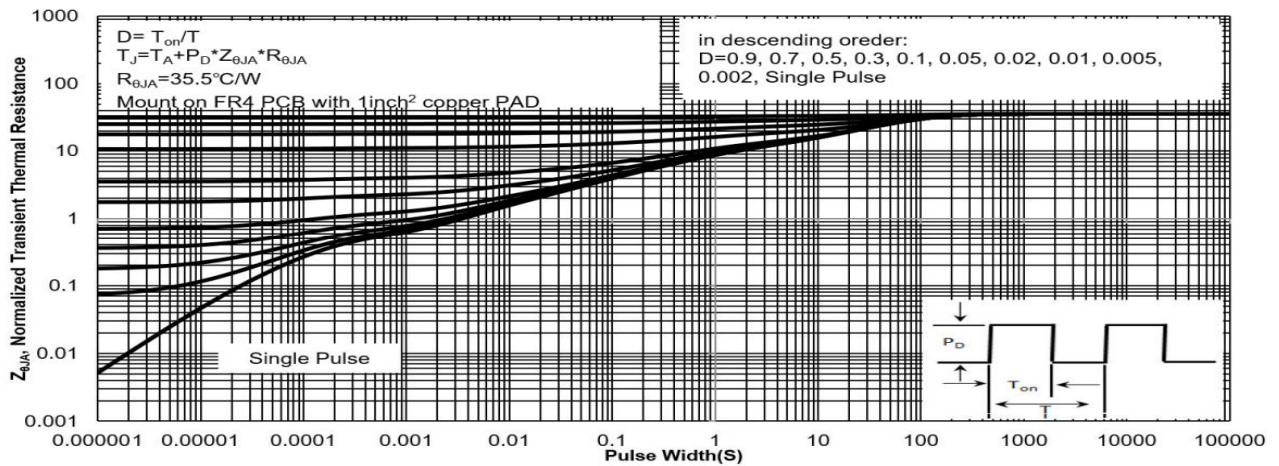
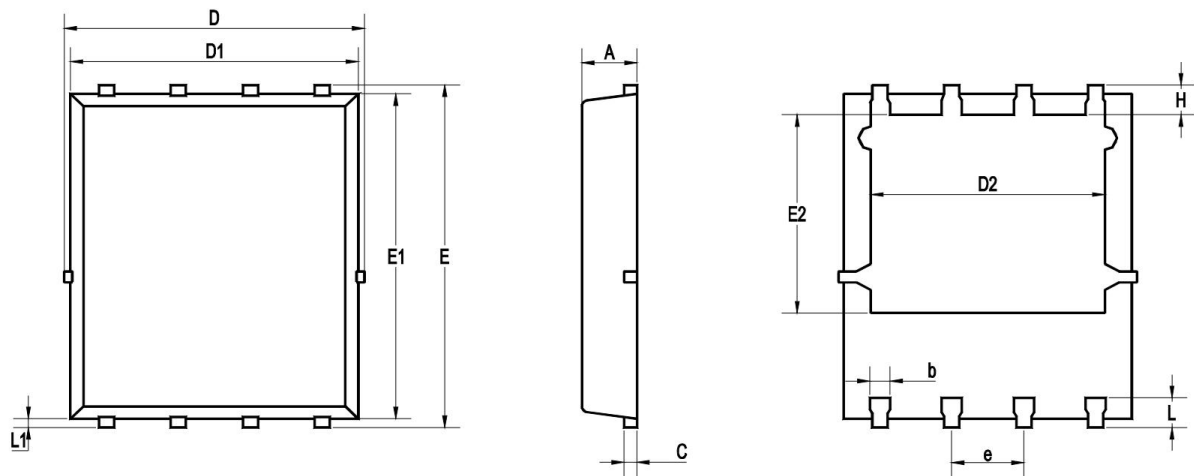


Fig.14 Normalized Maximum Transient Thermal Impedance($Z_{\theta JA}$)



PDFN5*6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.120	0.035	0.044
b	0.330	0.510	0.013	0.020
C	0.110	0.340	0.004	0.013
D	4.700	5.260	0.185	0.207
D1	4.700	5.100	0.185	0.201
D2	3.560	4.500	0.140	0.177
E	5.750	6.250	0.226	0.246
E1	5.600	6.000	0.220	0.236
E2	3.180	3.660	0.125	0.144
e	1.170	1.370	0.046	0.054
L	0.350	0.710	0.014	0.028
L1	0.060	0.200	0.002	0.008
H	0.350	0.710	0.014	0.028