

### Product Summary

$V_{(BR)DSS}$	$R_{DS(on)MAX}$	$I_D$
40V	2.6mΩ@10V	166A

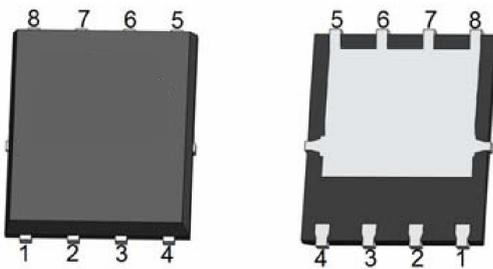
### Feature

- Split gate trench MOSFET technology
- Excellent package for heat dissipation
- High density cell design for low  $R_{DS(ON)}$
- Suffix "-Q1" for AEC-Q101

### Application

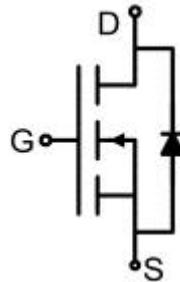
- Power switching application
- Uninterruptible power supply
- DC-DC convertor

### Package

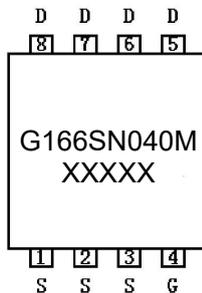


PDFN5\*6-8L

### Circuit diagram



### Marking



### Absolute maximum ratings (T<sub>C</sub>=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V <sub>DS</sub>	40	V
Gate-Source Voltage	V <sub>GS</sub>	±20	V
Continuous Drain Current <sup>1,3)</sup> (V <sub>GS</sub> =10V, Chip limitation)	I <sub>D</sub>	166	A
Continuous Drain Current <sup>1,3)</sup> (V <sub>GS</sub> =10V, T <sub>C</sub> =100°C)	I <sub>D</sub> (100°C)	118	A
Pulsed Drain Current (t <sub>p</sub> ≤10μs)	I <sub>DM</sub>	664	A
Single Pulse Avalanche Energy <sup>2)</sup>	E <sub>AS</sub>	182.25	mJ
Power Dissipation <sup>1,3)</sup>	P <sub>D</sub>	125	W
Thermal Resistance Junction to Case	R <sub>θJC</sub>	1.2	°C/W
Operating Junction Temperature	T <sub>J</sub>	-55 ~ +175	°C
Storage Temperature Range	T <sub>STG</sub>	-55 ~ +175	°C

### Electrical characteristics (T<sub>J</sub>=25 °C, unless otherwise noted)

Parameter	Symbol	Test Condition	Min.	Typ.	Max.	Unit
<b>Static Characteristics</b>						
Drain-source breakdown voltage	V <sub>(BR)DSS</sub>	V <sub>GS</sub> =0V, I <sub>D</sub> =250μA	40			V
Zero gate voltage drain current	I <sub>DSS</sub>	V <sub>DS</sub> =40V, V <sub>GS</sub> =0V			1	μA
Gate-body leakage current	I <sub>GSS</sub>	V <sub>DS</sub> =0V, V <sub>GS</sub> =±20V			±100	nA
Gate threshold voltage	V <sub>GS(th)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>D</sub> =250μA	2.2	3	3.7	V
Drain-source on-resistance	R <sub>DS(on)</sub>	V <sub>GS</sub> =10V, I <sub>D</sub> =50A		2	2.6	mΩ
<b>Dynamic characteristics<sup>4)</sup></b>						
Input Capacitance	C <sub>iss</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =0V, f =1MHz		2134		pF
Output Capacitance	C <sub>oss</sub>			1093		
Reverse Transfer Capacitance	C <sub>rss</sub>			76		
Total Gate Charge	Q <sub>g</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A		38.3		nC
Gate-Source Charge	Q <sub>gs</sub>			9.6		
Gate-Drain Charge	Q <sub>gd</sub>			12.3		
Turn-on delay time	t <sub>d(on)</sub>	V <sub>DS</sub> =20V, V <sub>GS</sub> =10V, I <sub>D</sub> =50A R <sub>G</sub> =3Ω		18		nS
Turn-on rise time	t <sub>r</sub>			124		
Turn-off delay time	t <sub>d(off)</sub>			26		
Turn-off fall time	t <sub>f</sub>			15		
<b>Source-Drain Diode characteristics</b>						
Diode Forward Current	I <sub>S</sub>				166	A
Diode Forward voltage	V <sub>SD</sub>	V <sub>GS</sub> =0V, I <sub>S</sub> =50A			1.2	V
Reverse Recovery Time	T <sub>rr</sub>	V <sub>GS</sub> =0V, V <sub>R</sub> =20V, I <sub>F</sub> =50A		29		nS
Reverse Recovery Charge	Q <sub>rr</sub>	di/dt =-100A/μs		16		nC

Notes:

- 1) The entire application environment impacts the thermal resistance values shown, they are not constant and are only valid for the particular conditions noted.
- 2) T<sub>J</sub>=25°C, V<sub>G</sub>=10V, R<sub>G</sub>=25Ω, L=0.5mH, I<sub>AS</sub>=27A.
- 3) Thermal resistance from junction to soldering point(on the exposed drain pad).
- 4) Guaranteed by design, not subject to production.

## Typical Characteristics

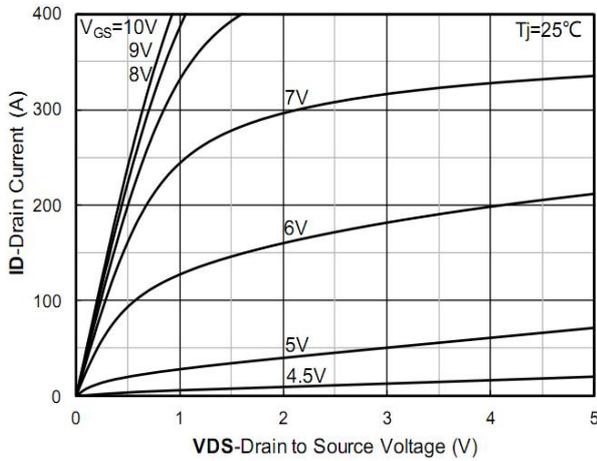


Figure 1. Output Characteristics; typical values

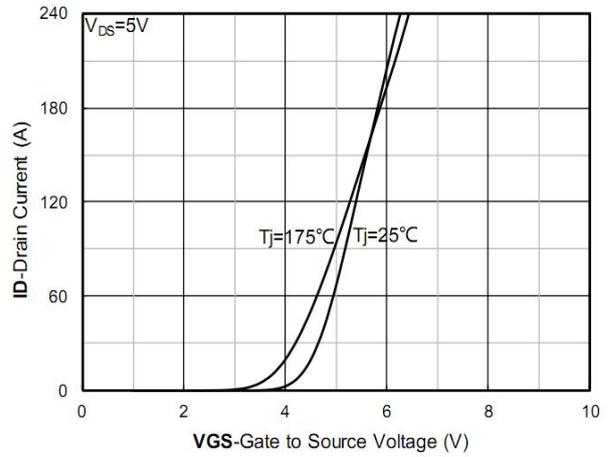


Figure 2. Transfer Characteristics; typical values

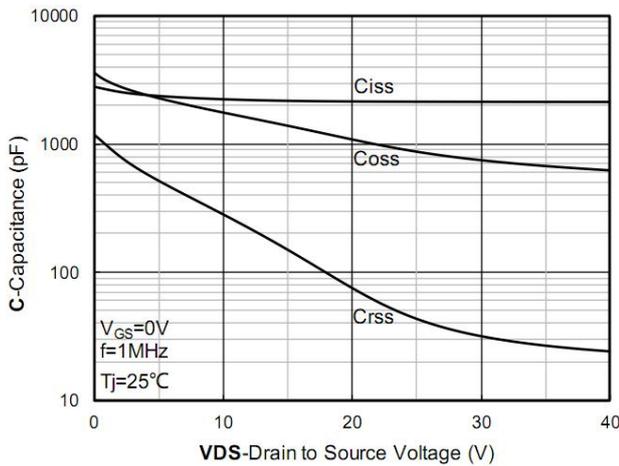


Figure 3. Capacitance Characteristics; typical values

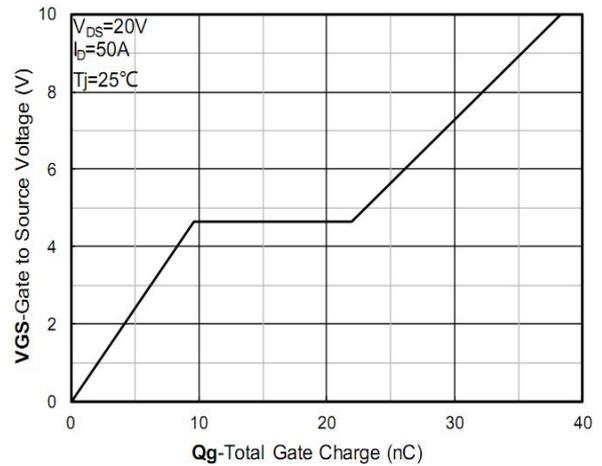


Figure 4. Gate Charge; typical values

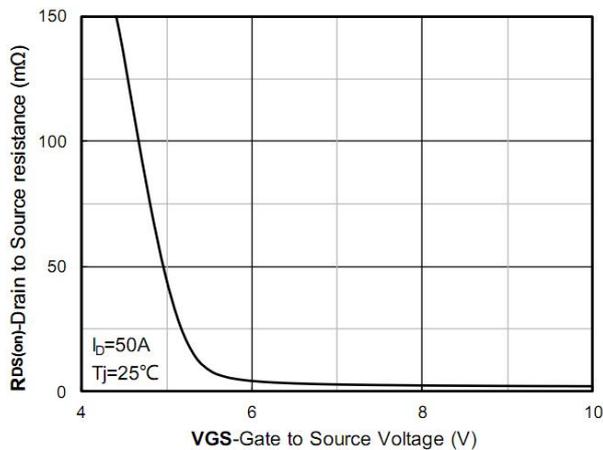


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

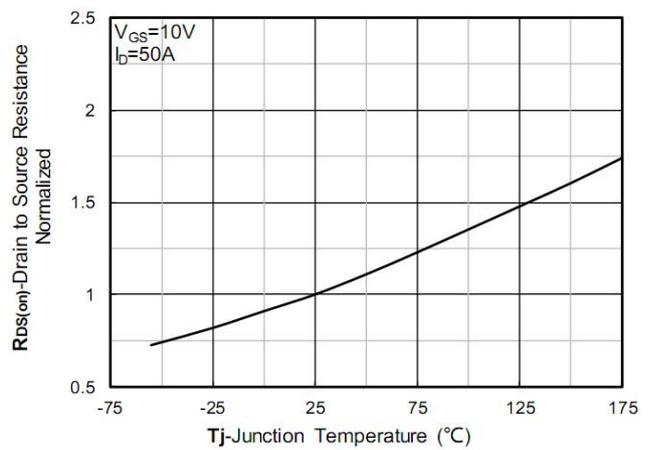


Figure 6. Normalized On-Resistance

## Typical Characteristics

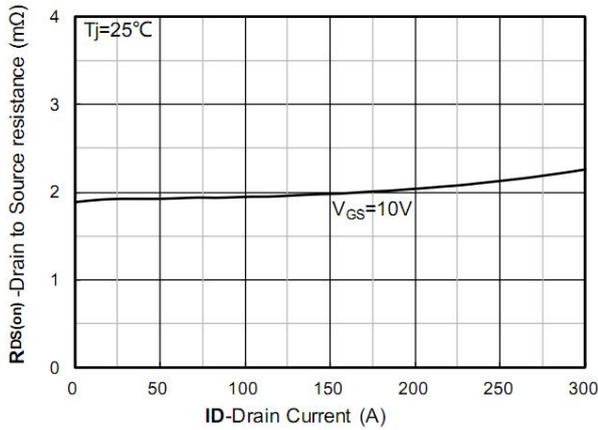


Figure 7.  $R_{DS(on)}$  vs. Drain Current; typical values

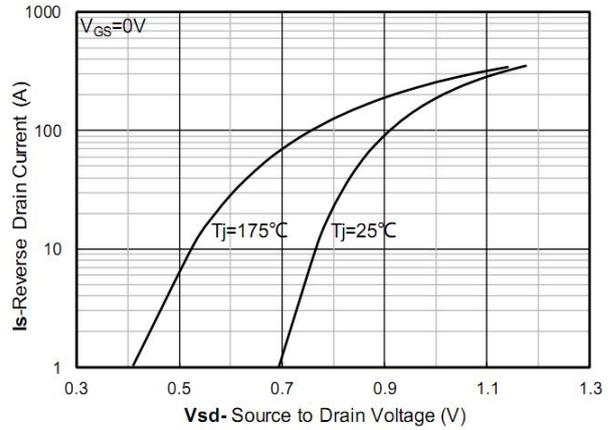


Figure 8. Forward characteristics of reverse diode; typical values

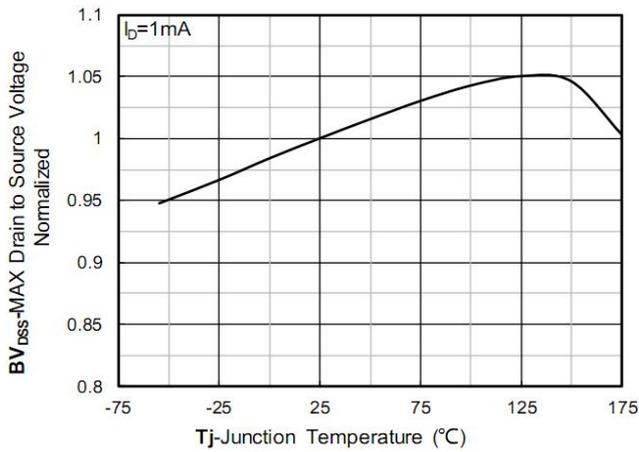


Figure 9. Normalized breakdown voltage

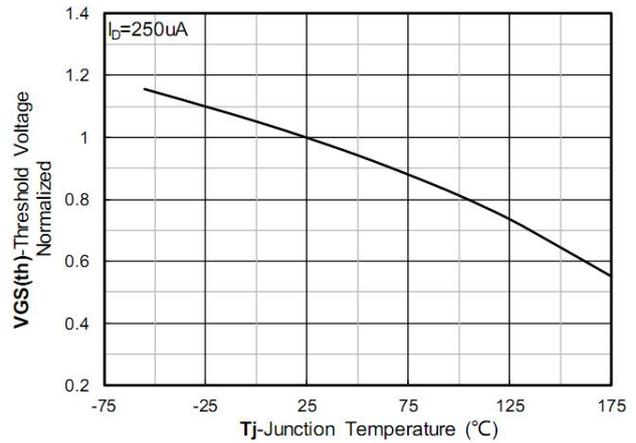


Figure 10. Normalized Threshold voltage

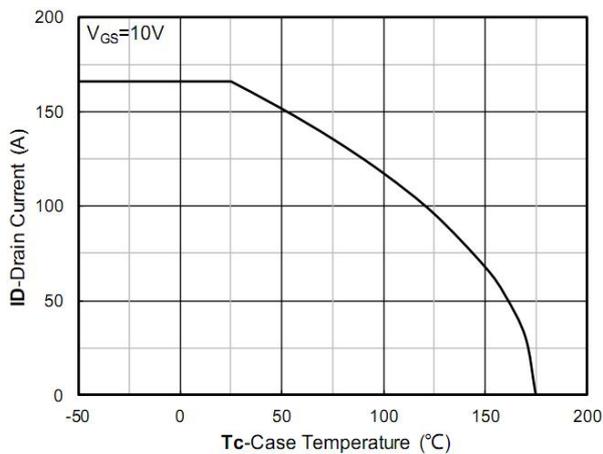


Figure 11. Current dissipation

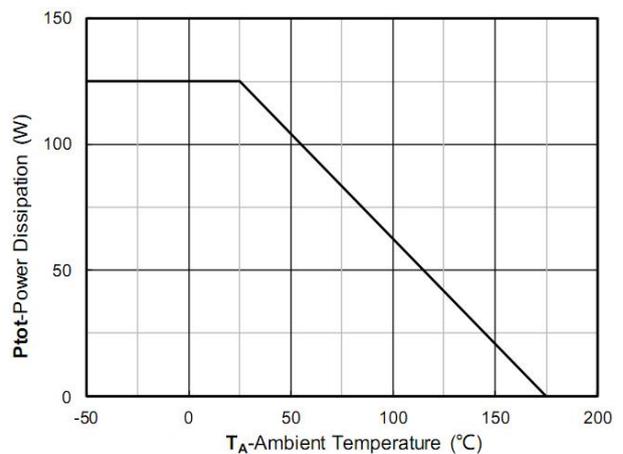


Figure 12. Power dissipation

## Typical Characteristics

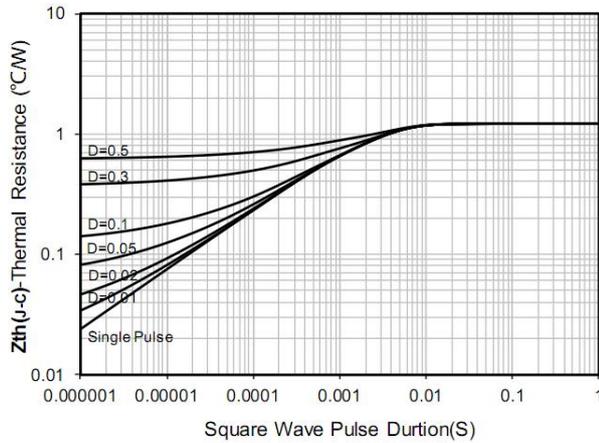


Figure 13. Maximum Transient Thermal Impedance

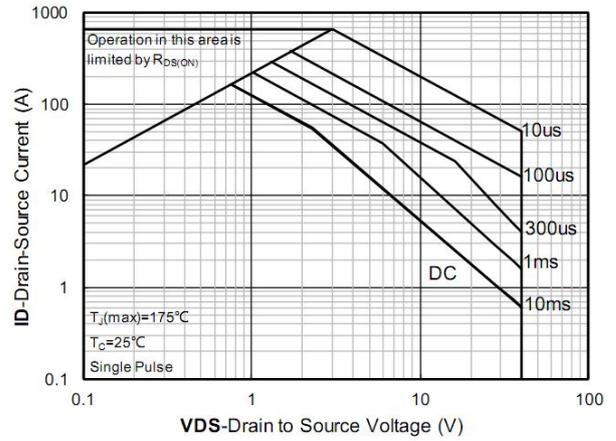
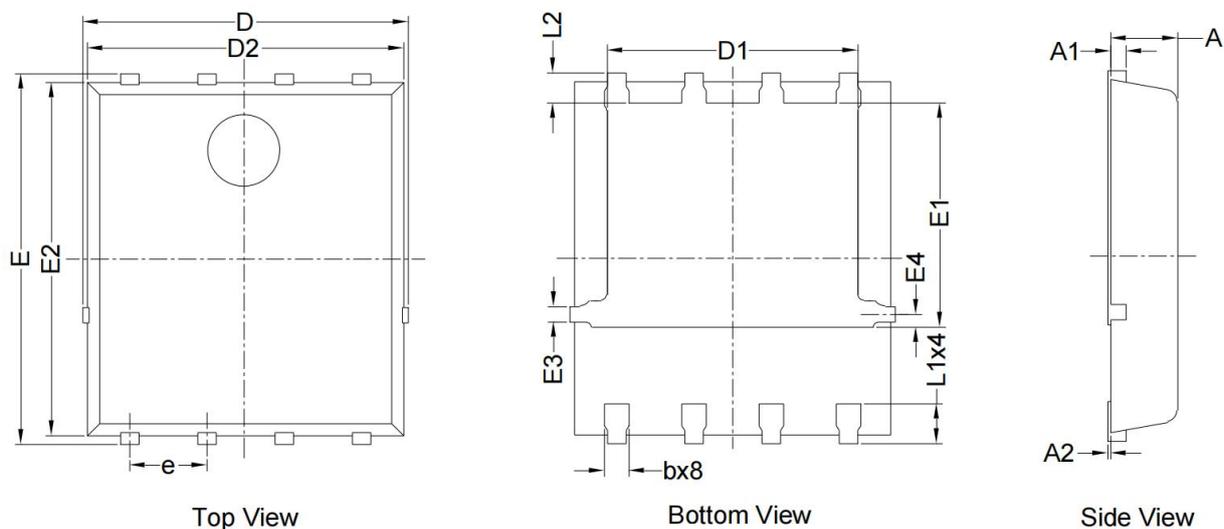


Figure 14. Safe Operation Area

### PDFN5\*6-8L Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
D	5.150	5.550	0.203	0.219
E	5.950	6.350	0.234	0.250
A	1.000	1.200	0.039	0.047
A1	0.254 BSC.		0.010 BSC.	
A2	0.000	0.100	0.000	0.004
D1	3.920	4.320	0.154	0.170
E1	3.520	3.920	0.139	0.154
D2	5.000	5.400	0.197	0.213
E2	5.660	6.060	0.223	0.239
E3	0.254 REF.		0.010 REF.	
E4	0.210 REF.		0.008 REF.	
L1	0.560	0.760	0.022	0.030
L2	0.500 BSC.		0.020 BSC.	
b	0.310	0.510	0.012	0.020
e	1.270 BSC.		0.050 BSC.	