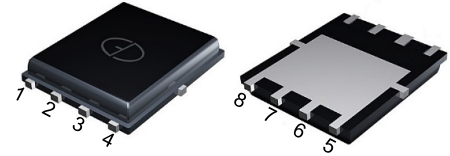


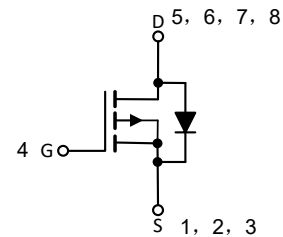
## P-Channel -40V (D-S) Power MOSFET

### Features

- 100% Avalanche Tested
- Extremely Low Losses with Low FOM  $R_{ds(on)} \cdot Q_g$
- Halogen Free, Pb-Free
- RoHS Compliant



PDFN5060



### Applications

- DC/DC
- Motors, lamps
- Power switching

### Absolute Maximum Ratings ( $T_J=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit	
Drain Source Voltage	$V_{DS}$	-40	V	
Gate Source Voltage	$V_{GS}$	$\pm 20$	V	
Drain Current, Continuous $V_{GS}=-10\text{V}$	$I_D$	$T_C=25^\circ\text{C}$	-83	A
		$T_C=100^\circ\text{C}$	-53	
Drain Current, Pulsed (Note 1)	$I_{DM}$	-332	A	
Single Avalanche Energy (Note 2)	$E_{AS}$	576	mJ	
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	58	W
		$T_C=100^\circ\text{C}$	23	
Operating Junction/ Storage Temperature Range	$T_J/ T_{STG}$	-55 to +150	$^\circ\text{C}$	

Note 1: Single pulse;  $t_p \leq 1\mu\text{s}$ .

Note 2:  $V_{DD} = -20\text{V}$ ,  $V_{GS} = -10\text{V}$ ,  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ , starting  $T_J = 25^\circ\text{C}$ .

### Thermal Characteristics

Parameter	Symbol	Max	Unit
Thermal Resistance Junction to Case	$R_{thJC}$	2.15	$^\circ\text{C/W}$
Thermal Resistance Junction to Ambient (Note 3)	$R_{thJA}$	62.5	$^\circ\text{C/W}$

Note 3: Device mounted on 1 square inch FR4 PCB board, with 2oz single-sided copper, in a  $25^\circ\text{C}$  still air environment.

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

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
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	uA
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =-250uA	-1	--	-2.5	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±20V, V <sub>DS</sub> =0V	--	--	±100	nA
Drain-Source On-state Resistance (Note 4)	R <sub>DS(on)</sub>	V <sub>GS</sub> =-10V, I <sub>D</sub> =-15A	--	4.3	5.6	mΩ
Total Gate Charge	Q <sub>g</sub>	V <sub>GS(off)</sub> =0V, V <sub>GS(on)</sub> =-10V, V <sub>DD</sub> =-20V, I <sub>D</sub> =-20A	--	118	--	nC
Gate-Source Charge	Q <sub>gs</sub>		--	13	--	
Gate-Drain Charge	Q <sub>gd</sub>		--	22	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =-10V, V <sub>DD</sub> =-20V, R <sub>L</sub> =1Ω, R <sub>G</sub> =3Ω	--	16	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	17	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	68	--	
Turn-off Fall Time	t <sub>f</sub>		--	31	--	
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =-20V, f=1MHz	--	6638	--	pF
Output Capacitance	C <sub>oss</sub>		--	545	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	345	--	

### Reverse Diode Characteristics (T<sub>J</sub> =25°C unless otherwise noted)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Forward Current, Continuous	I <sub>SD</sub>	T <sub>C</sub> =25°C	--	--	-77	A
Diode Forward Voltage (Note 4)	V <sub>SD</sub>	I <sub>F</sub> =-20A, V <sub>GS</sub> =0V	--	--	-1.2	V
Reverse Recovery Time	T <sub>rr</sub>	I <sub>F</sub> =-20A, di/dt = 100 A/μs	--	24	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>		--	140	--	nC

Note 4: Pulse test; pulse width ≤ 380μs, duty cycle ≤ 1%.

## Typical Characteristics Curves ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.1 - Output Characteristics

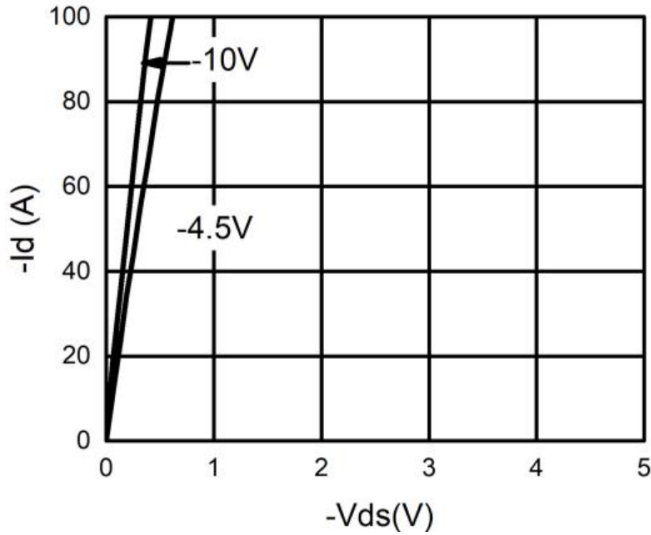


Fig.2 - Transfer Characteristics

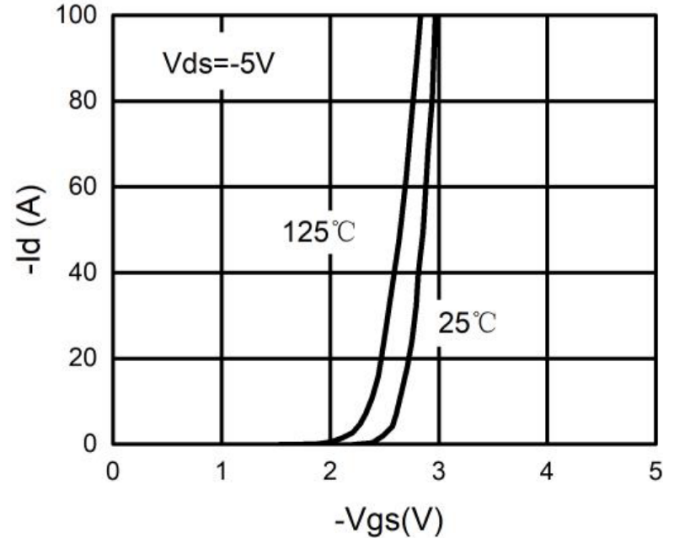


Fig.3 - Normalized On-Resistance

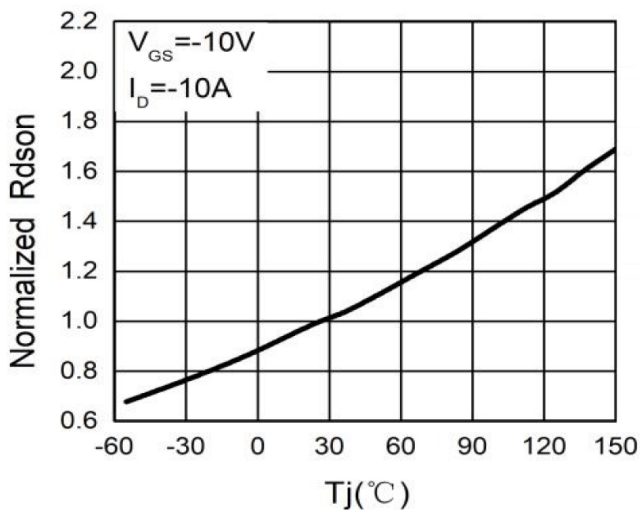


Fig.4 - Capacitance

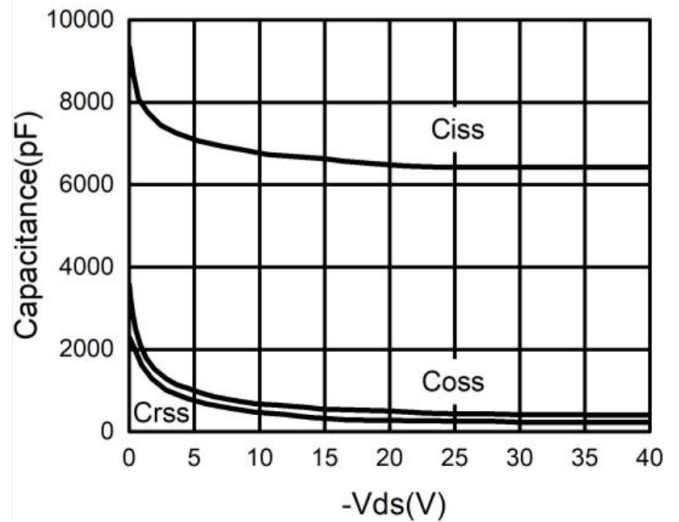


Fig.5 - Gate charge

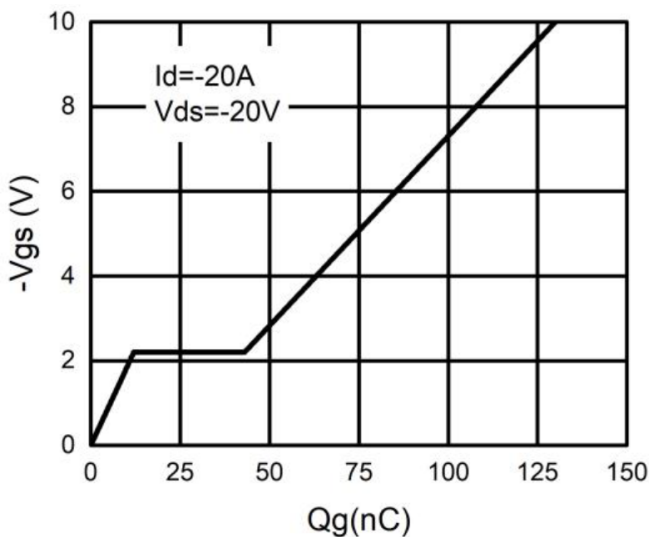
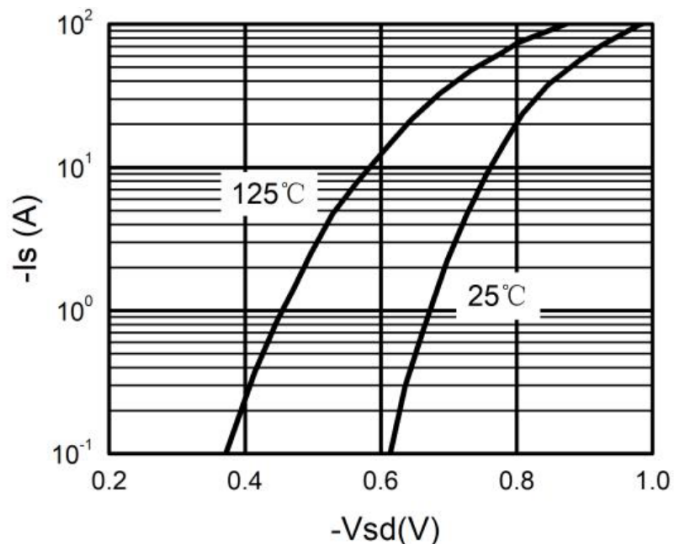


Fig.6 - Forward Characteristic



## Typical Characteristics Curves ( $T_J = 25^\circ\text{C}$ unless otherwise noted)

Fig.7 - Safe Operating Area

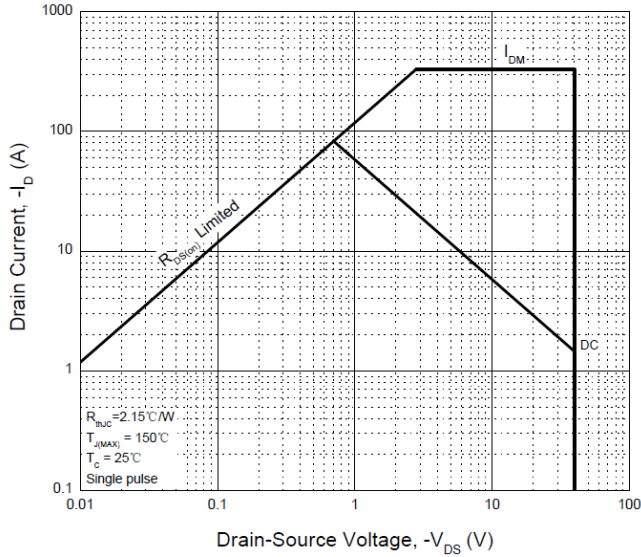


Fig.8 - Power Derating

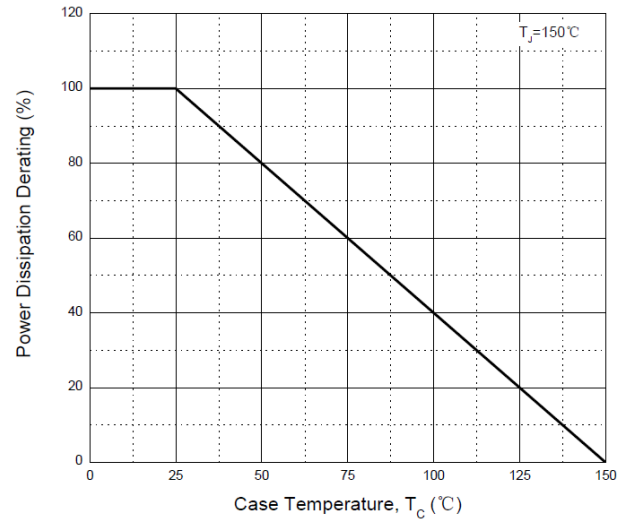
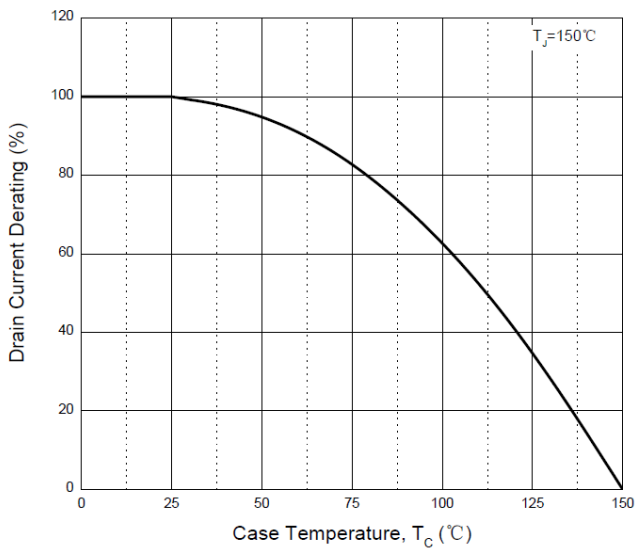
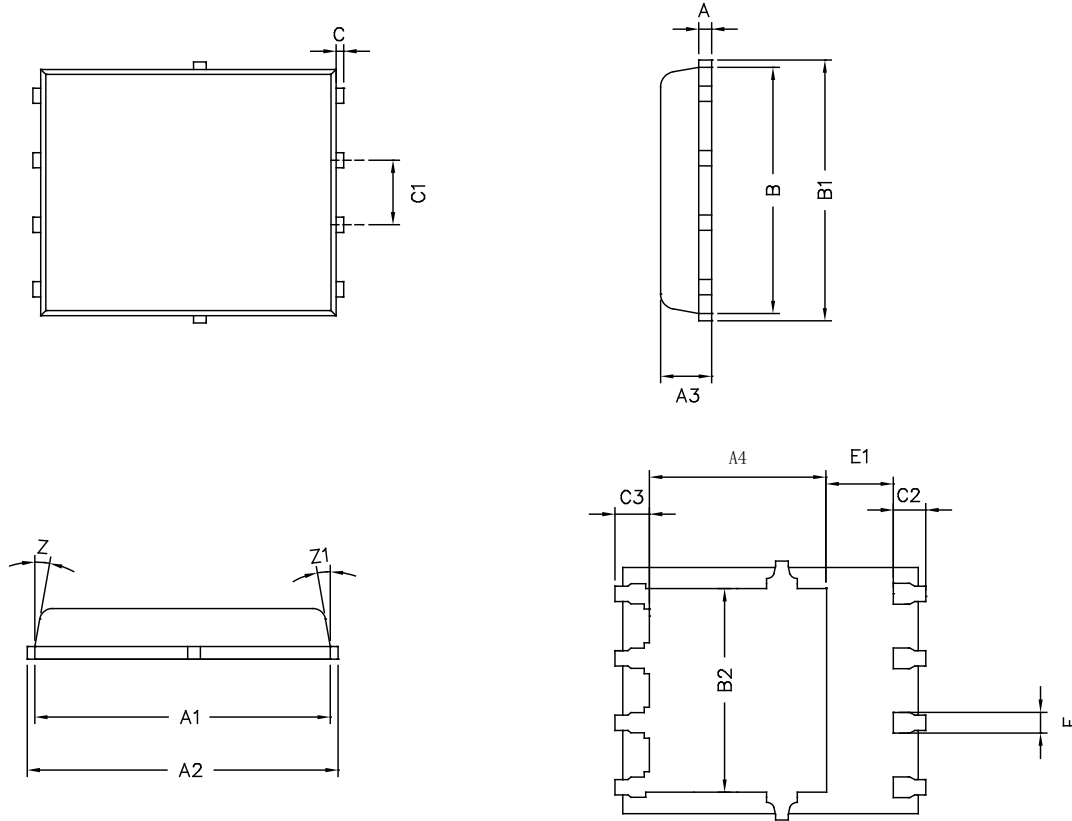


Fig.9 - Drain Current Derating



**Package Outline Dimensions** (Unit: millimeters)

**PDFN5060**



PDFN5060							
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.15	0.25	0.35	C	0.05	0.15	0.25
A1	5.6	5.8	6.0	C1	1.17	1.27	1.37
A2	5.9	6.1	6.3	C2	0.53	0.63	0.73
A3	0.9	1.0	1.1	C3	0.53	0.63	0.73
A4	-	3.5	-	E	0.31	0.41	0.51
B	4.7	4.9	5.1	E1	1.2	1.3	1.4
B1	5.0	5.2	5.4	Z	8°	10°	12°
B2	-	4.01	-	Z1	8°	10°	12°

## Marking Outline



Part Name: GMP00504M

1. Logo Mark: 
2. P/N Mark: 00504M
3. Date Code: XXXX
4. Pin 1#: ●

## Revision History

Version	Date	Major Changes
Rev.A	2024.04.30	Official Release

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