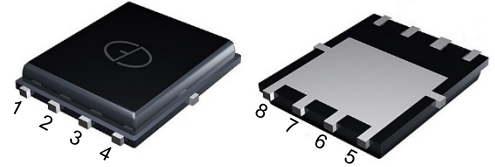


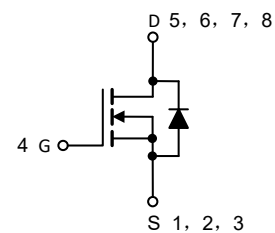
## N-Channel 40V (D-S) Power MOSFET

### Features

- 100% Avalanche Tested
- Extremely Low Losses with Low FOM  $R_{ds(on)} \cdot Q_g$
- RoHS Compliant, Halogen Free, Pb-Free
- AEC-Q101 Qualified
- MSL 1



PDFN5060



### Applications

- Automotive systems
- Motors, lamps and solenoid control
- Ultra high performance 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 $V_{GS}=10\text{V}$	$I_D$	$T_C=25^\circ\text{C}$	128
		$T_C=100^\circ\text{C}$	91
Drain Current, Pulsed (Note 1)	$I_{DM}$	512	A
Single Avalanche Energy (Note 2)	$E_{AS}$	96	mJ
Power Dissipation	$P_D$	$T_C=25^\circ\text{C}$	188
		$T_C=100^\circ\text{C}$	94
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to +175	$^\circ\text{C}$

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

Note 2:  $V_{DD} = 40\text{V}$ ,  $V_{GS} = 10\text{V}$ ,  $L = 0.5\text{mH}$ ,  $R_G = 25\Omega$ , starting  $T_J = 25^\circ\text{C}$ .

### Thermal Characteristics

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Case	$R_{thJC}$	0.8	$^\circ\text{C/W}$
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	μA
Gate Threshold Voltage	V <sub>GS(TH)</sub>	V <sub>DS</sub> =V <sub>GS</sub> , I <sub>DS</sub> =250μA	1	1.8	2.5	V
Gate Leakage Current	I <sub>GSS</sub>	V <sub>GS</sub> =±10V, 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> =20A	--	4.5	5.4	mΩ
		V <sub>GS</sub> =4.5V, I <sub>D</sub> =15A	--	7.2	8.6	
Total Gate Charge	Q <sub>g</sub>	V <sub>GS(off)</sub> =0V, V <sub>GS(on)</sub> =10V, V <sub>DD</sub> =30V, I <sub>D</sub> =40A	--	57	--	nC
Gate Source Charge	Q <sub>gs</sub>		--	16.4	--	
Gate Drain Charge	Q <sub>gd</sub>		--	8.5	--	
Turn-on Delay Time	t <sub>d(on)</sub>	V <sub>GS</sub> =10V, V <sub>DD</sub> =30V, R <sub>L</sub> =0.75Ω, R <sub>G</sub> =3Ω	--	11	--	ns
Turn-on Rise Time	t <sub>r</sub>		--	97	--	
Turn-off Delay Time	t <sub>d(off)</sub>		--	42	--	
Turn-off Fall Time	t <sub>f</sub>		--	109	--	
Gate Resistance	R <sub>g</sub>	V <sub>GS</sub> =0V, f=1MHz, open drain	--	1.8	--	Ω
Input Capacitance	C <sub>iss</sub>	V <sub>GS</sub> =0V, V <sub>DS</sub> =20V, f=1MHz	--	3000	--	pF
Output Capacitance	C <sub>oss</sub>		--	250	--	
Reverse Transfer Capacitance	C <sub>rss</sub>		--	170	--	

## 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	--	--	122	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>	V <sub>R</sub> = 20V, I <sub>F</sub> = 20A, di/dt = 100 A/μs	--	16.5	--	ns
Reverse Recovery Charge	Q <sub>rr</sub>		--	8.5	--	nC

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

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

Fig. 1 - Output Characteristics

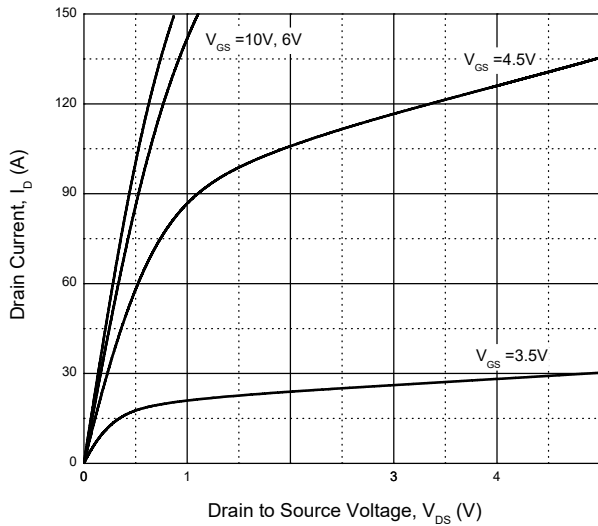


Fig. 2 - Transfer Characteristics

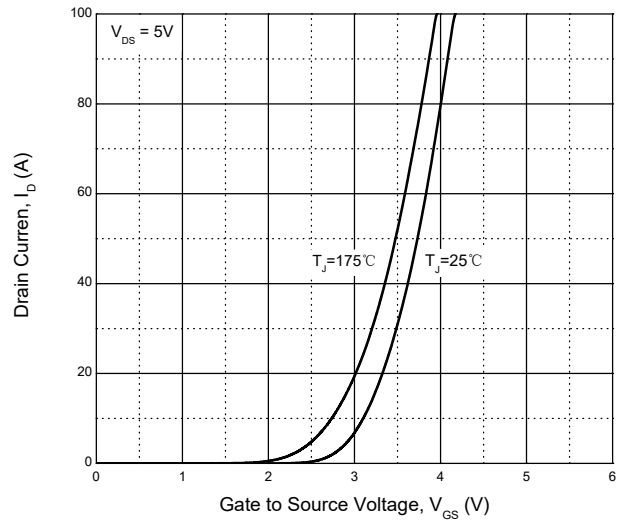


Fig. 3 - Drain-Source On-Resistance

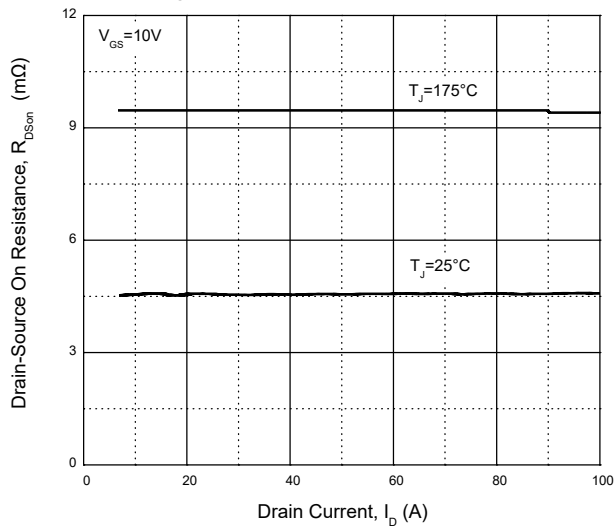


Fig. 4 - Normalized On-Resistance

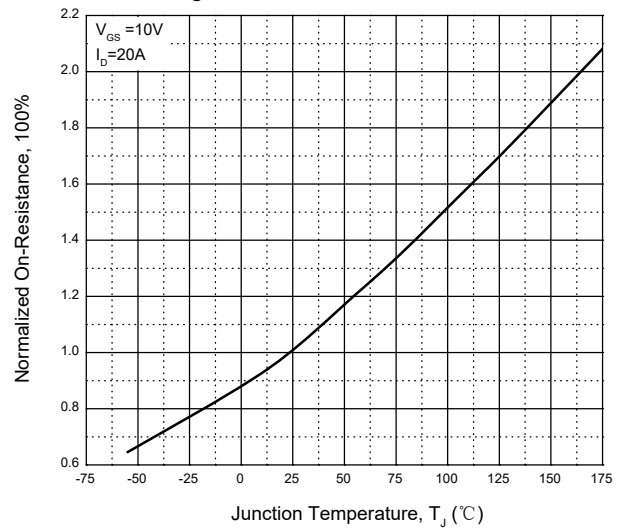


Fig. 5 - Drain-Source On-Resistance

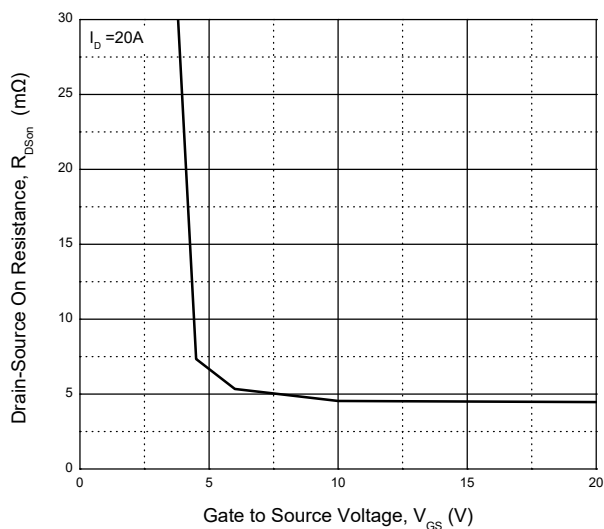
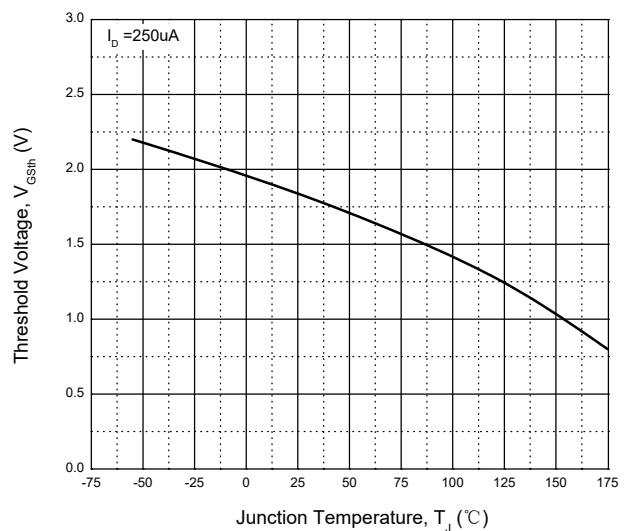


Fig. 6 - Threshold Voltage



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

Fig. 7 - Capacitance

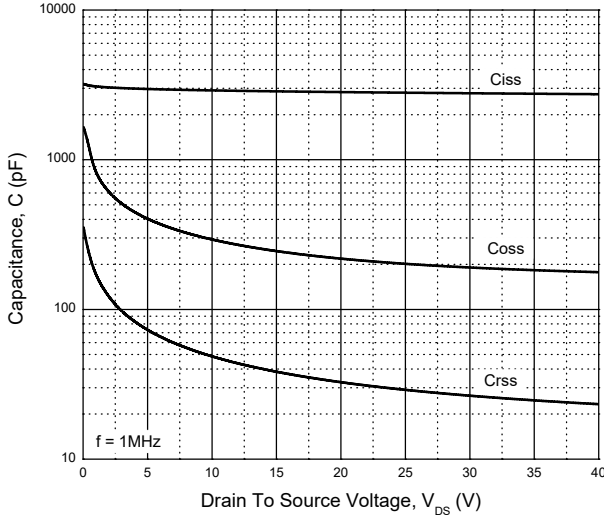


Fig. 8 - Gate Charge

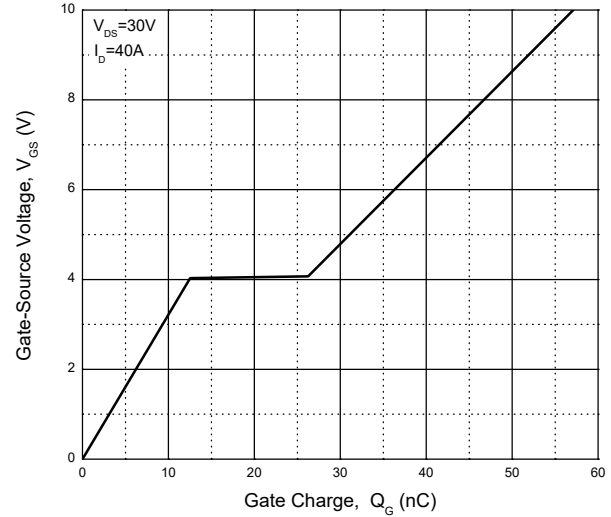


Fig. 9 - Forward Characteristic

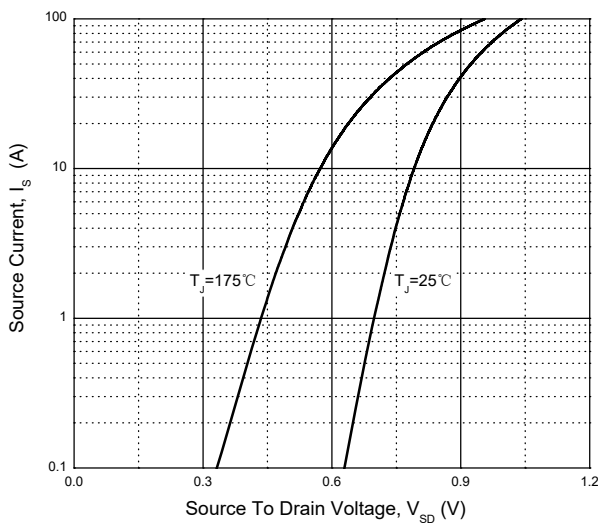


Fig. 10 - Safe Operating Area

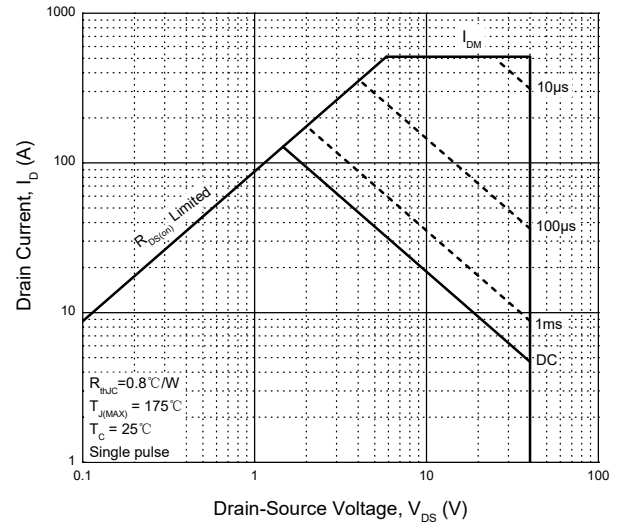
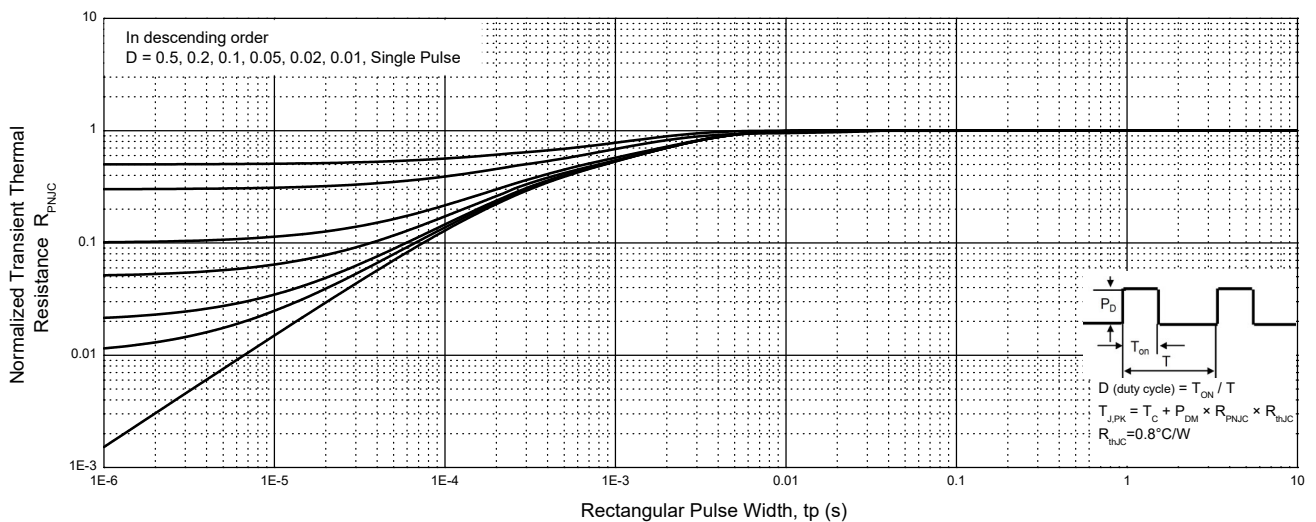


Fig.11 - Normalized Thermal Impedance, Junction-Case



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

Fig. 12 - Power Derating

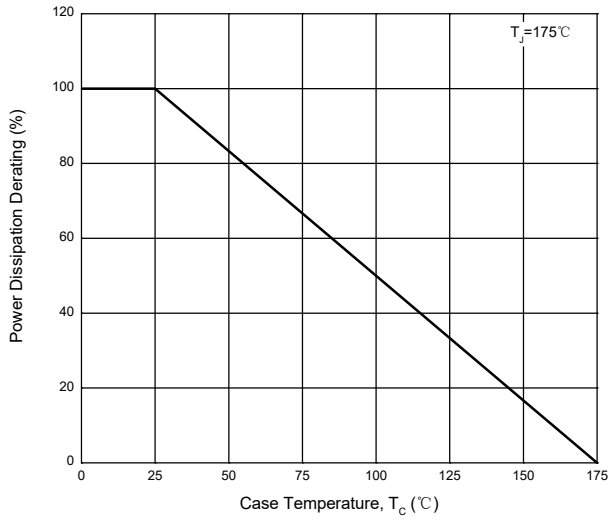
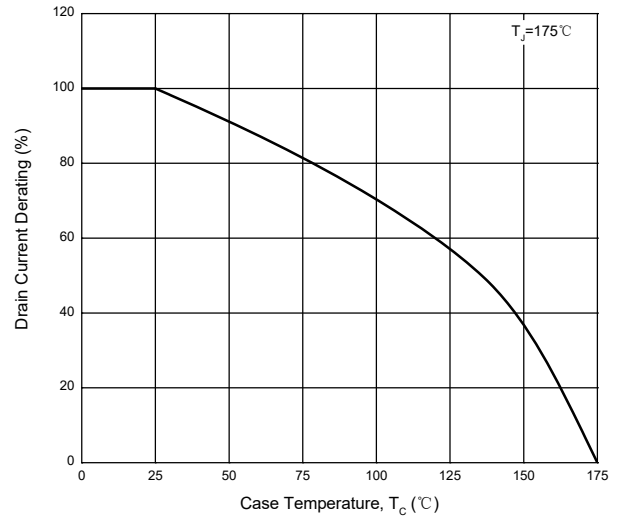
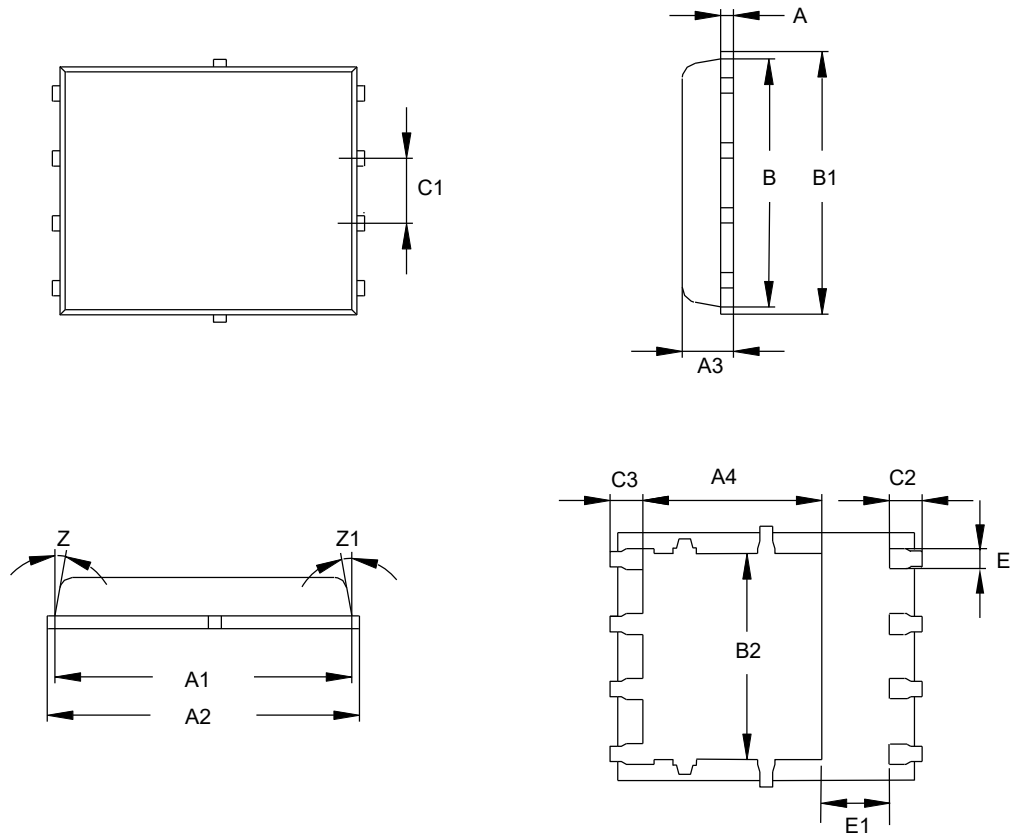


Fig. 13 - Drain Current Derating



## 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	5.65	5.75	5.85	C1	1.17	1.27	1.37
A2	5.9	6.0	6.1	C2	0.51	0.61	0.71
A3	0.9	1	1.1	C3	0.525	0.625	0.725
A4	3.375	3.475	3.575	E	0.35	0.4	0.45
B	4.8	4.9	5.0	E1	1.19	1.29	1.39
B1	5.0	5.0	5.4	Z	8°	10°	12°
B2	3.91	4.01	4.11	Z1	8°	10°	12°

**Marking Outline**



Part Name: AGMN05404LM

1. Logo Mark: 
2. P/N Mark: 05404LM
3. Date Code: AXXXX
4. Pin 1#: ●

**Revision History**

Version	Date	Major Changes
Rev.A	2024.04.25	Official Release

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