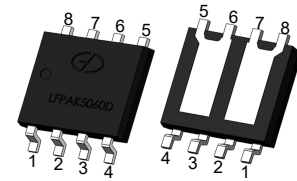


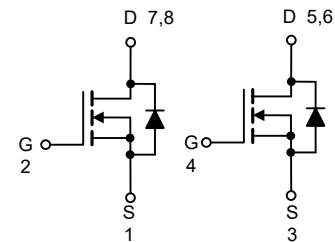
N-Channel 60V (D-S) Power MOSFET

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



LFPAK5060D



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, Single-side)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current, Continuous $V_{GS}=10\text{V}$	I_D	$T_C=25^\circ\text{C}$	29
		$T_C=100^\circ\text{C}$	21
Drain Current, Pulsed (Note 1)	I_{DM}	116	A
Single Avalanche Energy (Note 2)	E_{AS}	23.5	mJ
Power Dissipation	P_D	$T_C=25^\circ\text{C}$	50
		$T_C=100^\circ\text{C}$	25
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: $V_{DD} = 30\text{V}$, $V_{GS} = 5\text{V}$, $L = 0.1\text{mH}$, $R_G = 25\Omega$, starting $T_J = 25^\circ\text{C}$.

Thermal Characteristics (Single-side active)

Parameter	Symbol	Max.	Unit
Thermal Resistance Junction to Case	R_{thJC}	3	$^\circ\text{C/W}$
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°C still air environment.

Electrical Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS}=0V, I_D=250\mu A$	60	--	--	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=60V, V_{GS}=0V$	--	--	1	μA
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_{DS}=250\mu A$	1.1	1.5	1.9	V
Gate Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	--	--	± 100	nA
Drain-Source On-state Resistance (Note 4)	$R_{DS(on)}$	$V_{GS}=10V, I_D=5A$	--	22	29	m Ω
		$V_{GS}=5V, I_D=5A$	--	23.5	31	
Total Gate Charge	Q_g	$V_{GS(off)}=0V, V_{GS(on)}=10V, V_{DD}=48V, I_D=5A$	--	28.7	--	nC
Gate-Source Charge	Q_{gs}		--	2.6	--	
Gate-Drain Charge	Q_{gd}		--	6.4	--	
Turn-on Delay Time	$t_{d(on)}$	$V_{GS}=5V, V_{DD}=48V, I_D=5A, R_G=5\Omega$	--	16.3	--	ns
Turn-on Rise Time	t_r		--	25.1	--	
Turn-off Delay Time	$t_{d(off)}$		--	46.9	--	
Turn-off Fall Time	t_f		--	26.3	--	
Gate Resistance	R_g	$V_{GS}=0V, f=1\text{MHz}, \text{open drain}$	--	2.1	--	Ω
Input Capacitance	C_{iss}	$V_{GS}=0V, V_{DS}=25V, f=1\text{MHz}$	--	1429	--	pF
Output Capacitance	C_{oss}		--	88	--	
Reverse Transfer Capacitance	C_{rss}		--	60	--	

Reverse Diode Characteristics ($T_J = 25^\circ\text{C}$ unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Forward Current, Continuous	I_{SD}	$T_C=25^\circ\text{C}$	--	--	52	A
Diode Forward Voltage (Note 4)	V_{SD}	$I_F=10A, V_{GS}=0V$	--	--	1.2	V
Reverse Recovery Time	T_{rr}	$V_R=30V, I_F=5A, di/dt=100A/\mu s$	--	23.2	--	ns
Reverse Recovery Charge	Q_{rr}		--	19.5	--	nC

Note 4: Pulse test; pulse width $\leq 380\mu s$, duty cycle $\leq 1\%$.

Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig. 1 - Output Characteristics

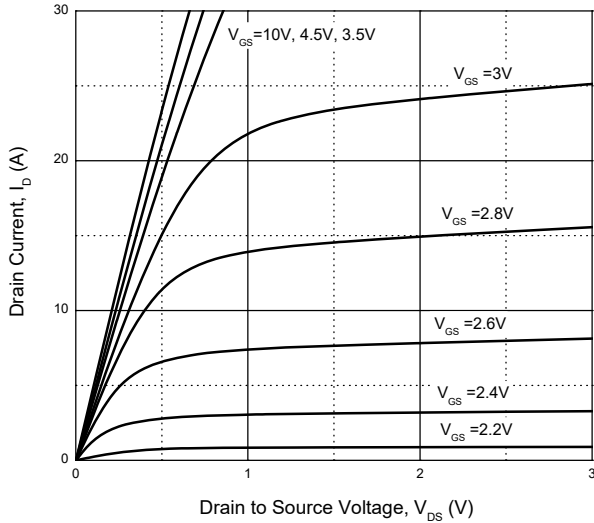


Fig. 2 - Transfer Characteristics

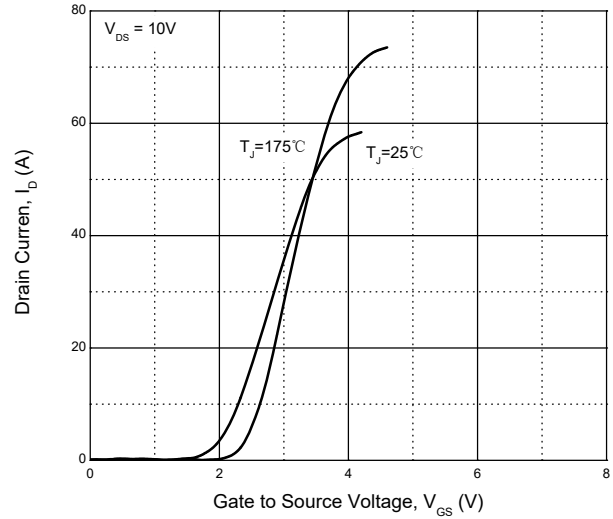


Fig. 3 - Drain-Source On-Resistance

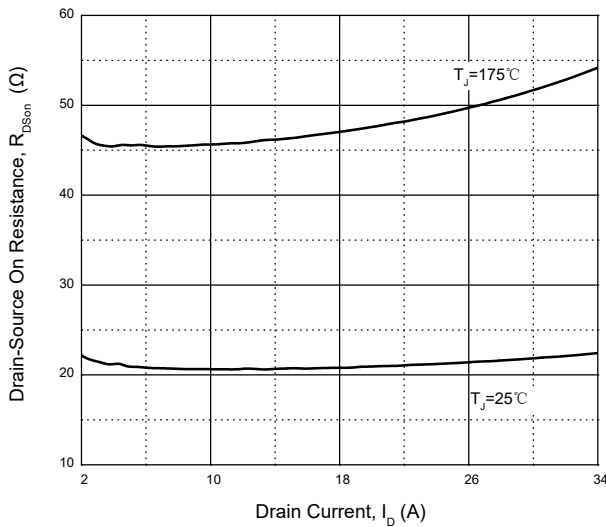


Fig. 4 - Normalized On-Resistance

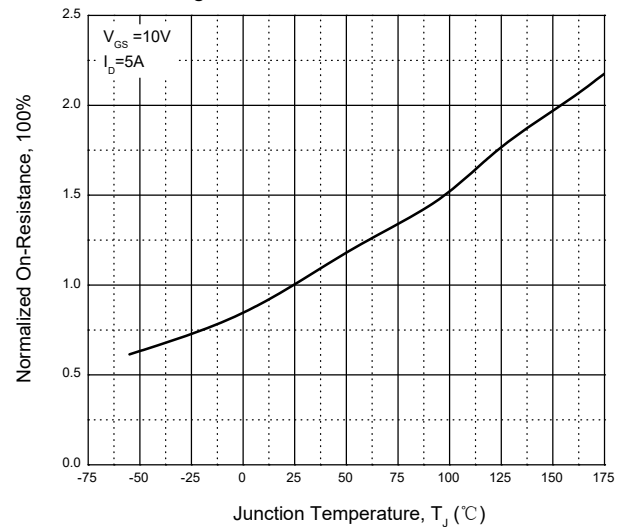


Fig. 5 - Drain-Source On-Resistance

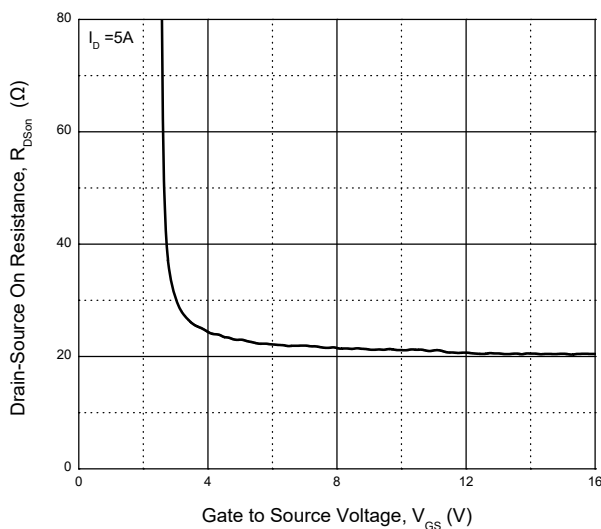
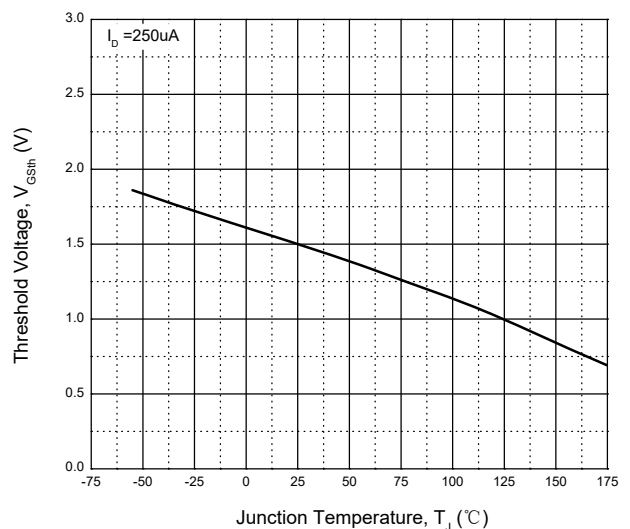


Fig. 6 - Threshold Voltage



Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig. 7 - Capacitance

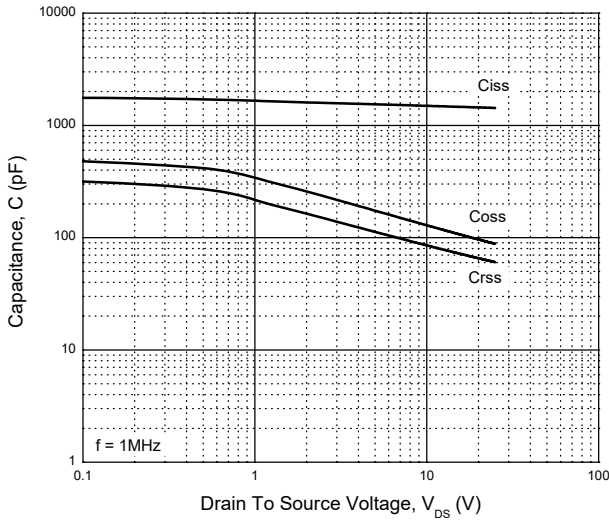


Fig. 8 - Gate Charge

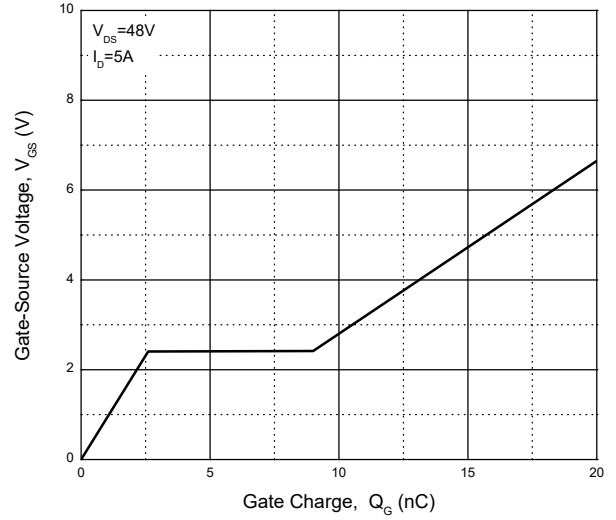


Fig. 9 - Forward Characteristic

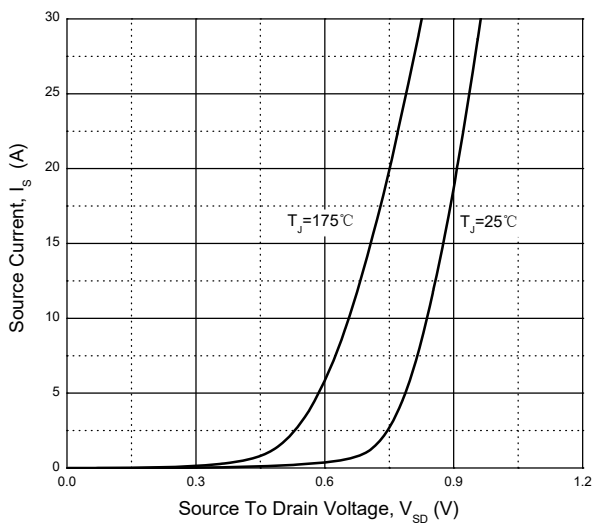


Fig. 10 - Safe Operating Area

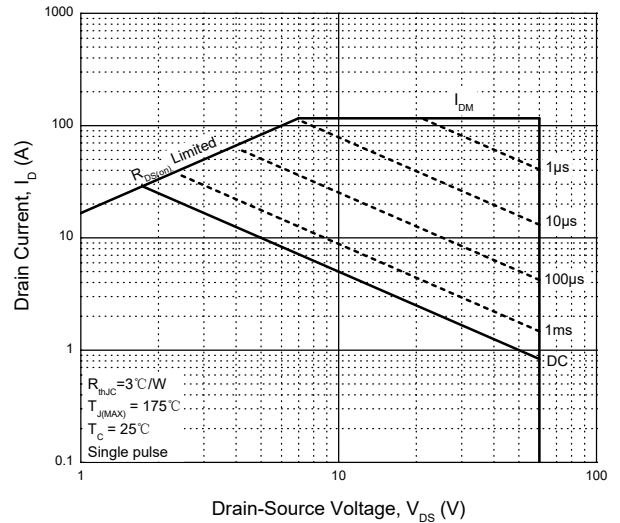
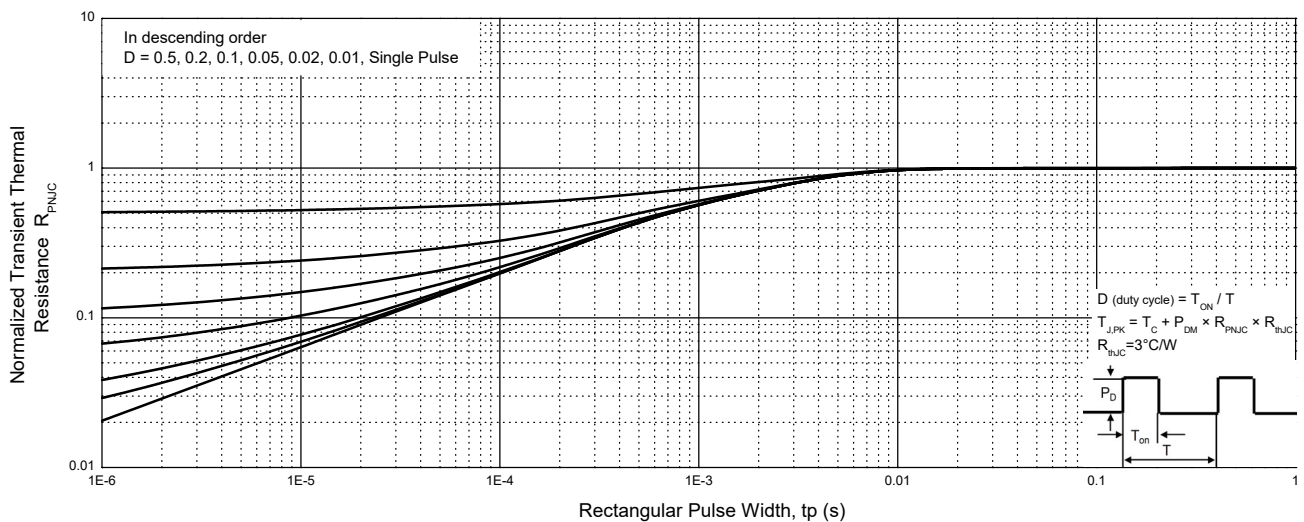


Fig.11 - Normalized Thermal Impedance, Junction-Case



Typical Characteristics Curves (T_J = 25°C unless otherwise noted)

Fig. 12 - Power Derating

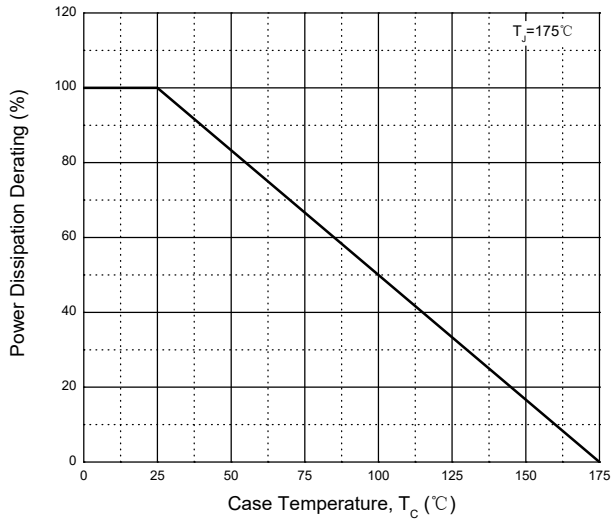
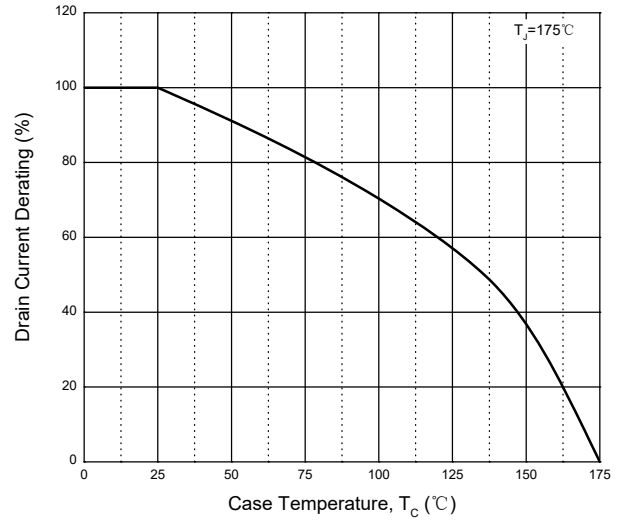
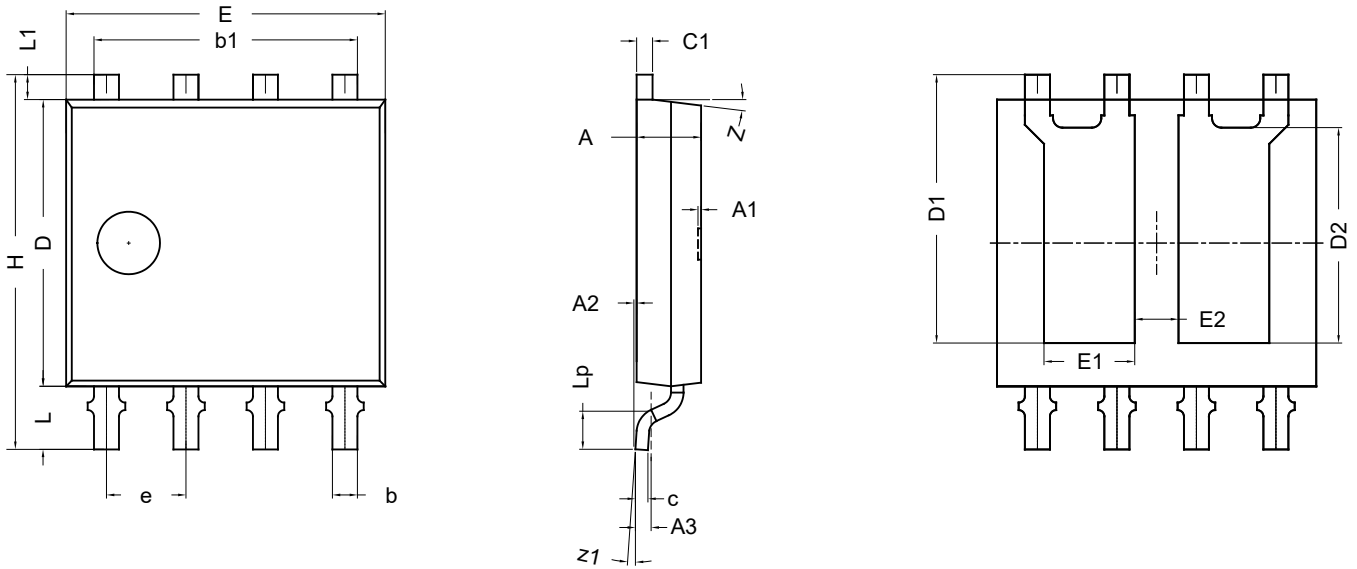


Fig. 13 - Drain Current Derating



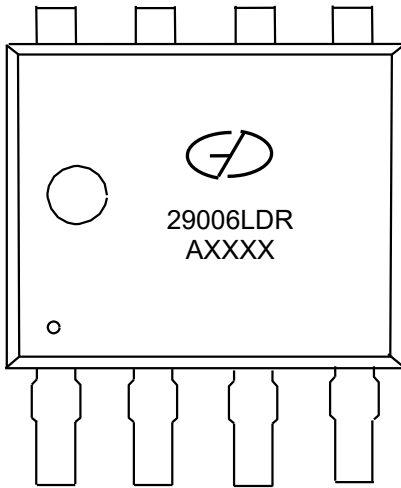
Package Outline Dimensions (Unit: millimeters)

LFPAK5060D



LFPAK5060D							
	Min.	Nom.	Max.		Min.	Nom.	Max.
A	0.980	1.030	1.080	E	4.950	5.100	5.300
A1	-	0.050	-	E1	1.300	1.450	1.600
A2	0.000	-	0.100	E2	-	0.700	0.850
A3	-	0.254	-	e	-	1.270	-
b	0.350	0.400	0.500	L	0.800	1.010	1.300
b1	4.10	4.210	4.400	L1	0.300	0.510	0.750
c	0.190	0.200	0.250	Lp	-	0.610	-
c1	0.240	0.254	0.300	H	5.900	6.000	6.200
D	4.450	4.590	4.700	Z	-	7°	-
D1	-	4.298	4.800	Z1	0°	-	8°
D2	-	3.450	-	-	-	-	-

Marking Outline



Part Name: AGMN29006LDR

1. Logo Mark: 
2. P/N Mark: 29006LDR
3. Date Code: AXXXX
4. Pin 1#: ○

Revision History

Version	Date	Major Changes
Rev.A	2024.06.02	Official Release

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