LWS60110A4

LW Silicon P-Channel Power MOSFET

V_{DSS}	-60	V
I_D	-12	A
P_D	30	W
$R_{DS(ON)\ TYPE}$	90	mΩ

General Description：

The LWS60110A4 uses advanced SGT technology and design to provide excellent $R_{DS(ON)}$ with low gate charge. It can be used in a wide variety of applications. The package form is TO-252, which accords with the ROHS standard and Halogen Free standard.

Features：
- Fast Switching
- Low Gate Charge and $R_{DS(ON)}$
- Low Reverse transfer capacitances

Applications：
- Battery switching application
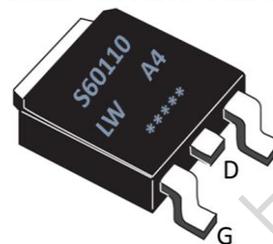- Hard switched and high frequency circuits
- Power Management

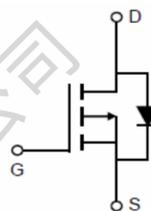*100% DVDS Tested*
100% Avalanche Tested

Marking and Pin Assignment

Inner Equivalent Principium Chart

Package Marking and Ordering Information:

Marking	Part Number	Package	Packing	Qty.
S60110/LW A4/D.C.	LWS60110A4	TO-252	Reel	2500 Pcs

Absolute Maximum Ratings:

Symbol	Parameter		Value	Units
V_{DSS}	Drain-to-Source Voltage		-60	V
I_D	Continuous Drain Current	T_C=25℃	-12	A
	Continuous Drain Current	T_C=100℃	-7.6	A
I_{DM}[a1]	Pulsed Drain Current		-48	A
V_{GS}	Gate-to-Source Voltage		±20	V
P_D	Power Dissipation		30	W
E_{AS}[a2]	Single pulse avalanche energy		30	mJ
T_J, T_{STG}	Operating Junction and Storage Temperature Range		150, -55 to 150	℃
T_L	Maximum Temperature for Soldering		260	℃

Thermal Characteristics:

Symbol	Parameter	Value	Units
$R_{θJC}$	Thermal Resistance, Junction-to-Case	4.17	℃/W
$R_{θJA}$	Thermal Resistance, Junction-to-Ambient	50	℃/W

Electrical Characteristic ($T_A = 25$ °C, unless otherwise specified):

Static Characteristics

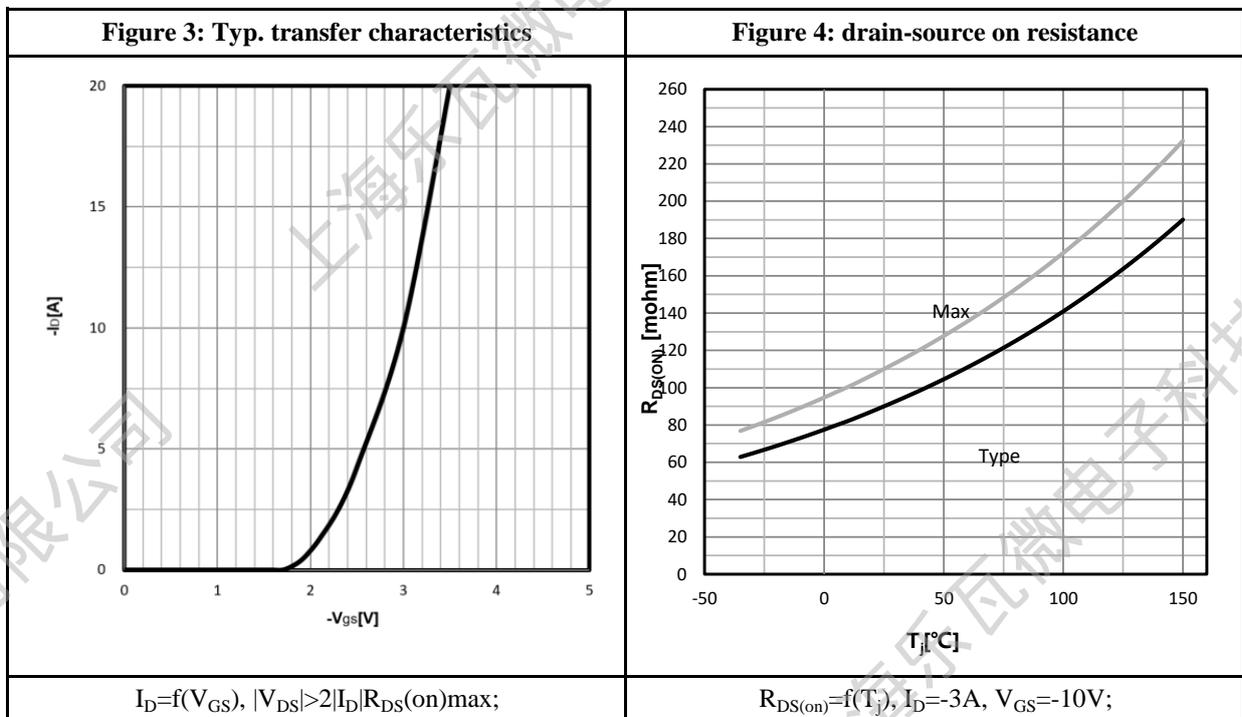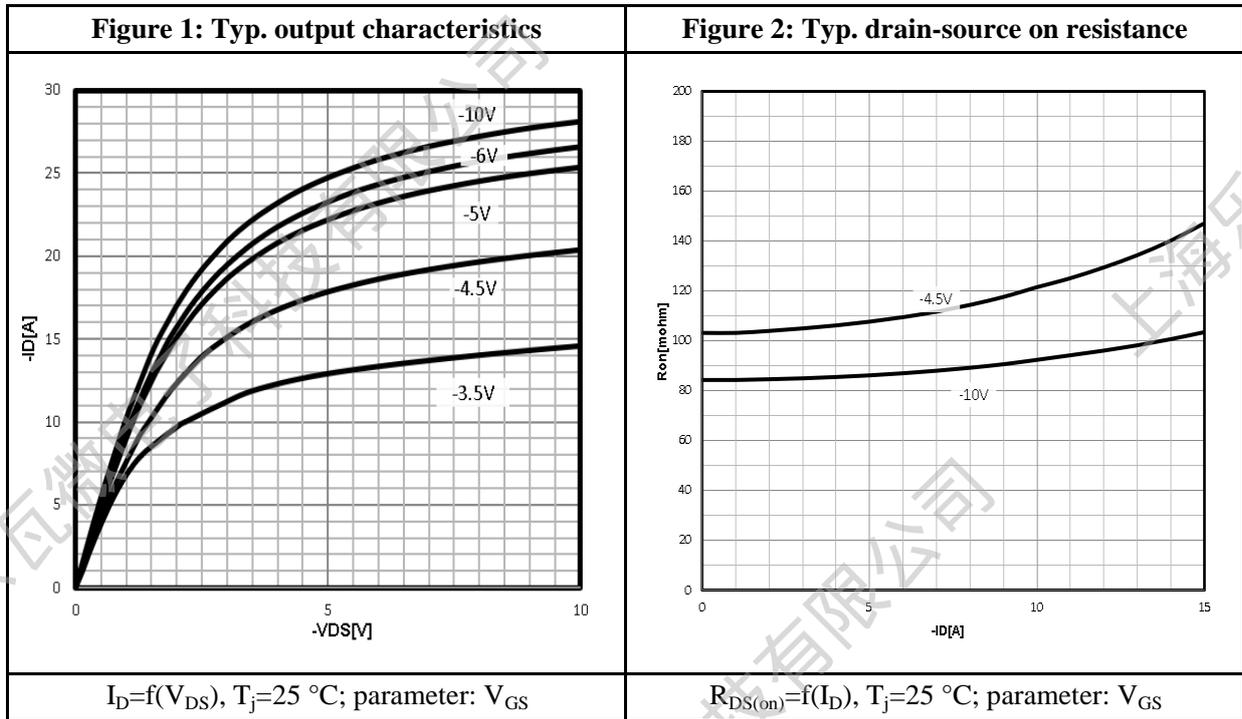| Symbol	Parameter	Test Conditions	Value Min.	Value Typ.	Value Max.	Units
V_{DSS}	Drain to Source Breakdown Voltage	$V_{GS}=0V$, $I_D=-250\mu A$	-60	--	--	V
I_{DSS}	Drain to Source Leakage Current	$V_{DS}=-60V$, $V_{GS}=0V$	--	--	1.0	μA
$I_{GSS(F)}$	Gate to Source Forward Leakage	$V_{GS}=-20V$, $V_{DS}=0V$	--	--	100	nA
$I_{GSS(R)}$	Gate to Source Reverse Leakage	$V_{GS}=+20V$, $V_{DS}=0V$	--	--	-100	nA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}$, $I_D=-250\mu A$	-1.2	-1.6	-2.0	V
$R_{DS(ON)1}$	Drain-to-Source On-Resistance	$V_{GS}=-10V$, $I_D=-3.0A$	--	90	110	mΩ
$R_{DS(ON)2}$	Drain-to-Source On-Resistance	$V_{GS}=-4.5V$, $I_D=-2.0A$	--	110	150	mΩ

Dynamic Characteristics

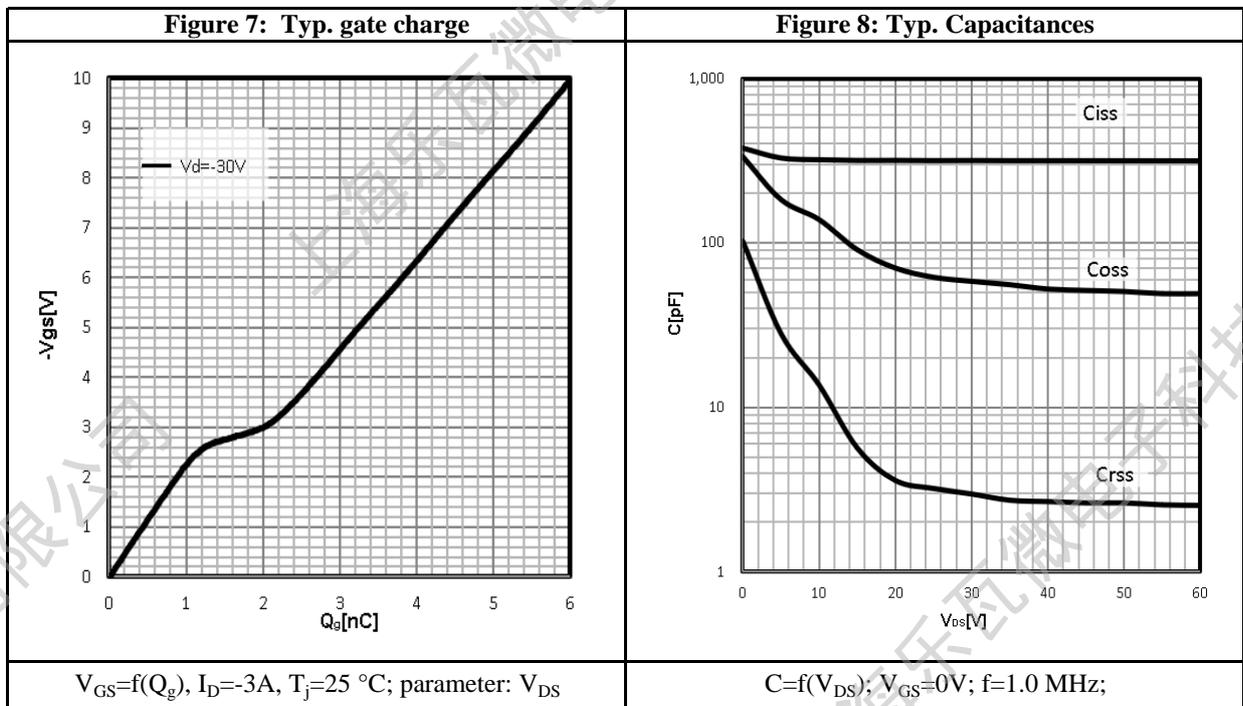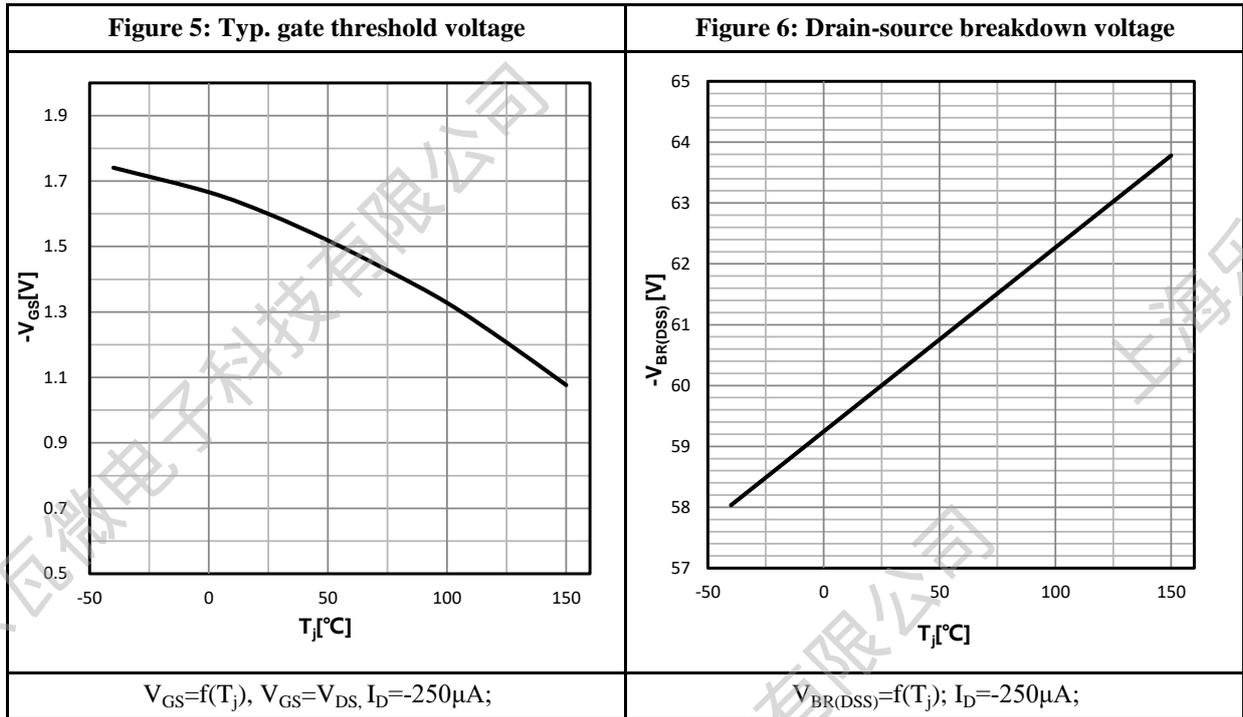| Symbol	Parameter	Test Conditions	Value Min.	Value Typ.	Value Max.	Units
C_{iss}	Input Capacitance	$V_{GS} = 0V$	--	315	--	pF
C_{oss}	Output Capacitance	$V_{DS} = -30V$	--	58	--	pF
C_{rss}	Reverse Transfer Capacitance	f = 1.0MHz	--	2.9	--	pF

Resistive Switching Characteristics

Symbol	Parameter	Test Conditions	Value Min.	Value Typ.	Value Max.	Units
$t_{d(ON)}$	Turn-on Delay Time	$I_D = -3A$	--	7	--	ns
t_r	Rise Time	$V_{DS} = -30V$	--	8	--	ns
$t_{d(OFF)}$	Turn-Off Delay Time	$V_{GS} = -10V$	--	16	--	ns
t_f	Fall Time	$R_G = 3\Omega$	--	4	--	ns
Q_g	Total Gate Charge	$V_{GS} = -10V$	--	4.9	--	nC
Q_{gs}	Gate Source Charge	$V_{DS} = -30V$	--	0.97	--	nC
Q_{gd}	Gate Drain Charge	$I_D = -3A$	--	0.72	--	nC

Source-Drain Diode Characteristics

Symbol	Parameter	Test Conditions	Value Min.	Value Typ.	Value Max.	Units
I_S	Diode Forward Current	$T_C = 25$ °C	--	--	-12	A
I_{SM}	Diode Pluse Current		--	--	-48	A
V_{SD}	Diode Forward Voltage	$I_S=-3A$, $V_{GS}=0V$	--	--	-1.2	V

a1：Repetitive rating; pulse width limited by maximum junction temperature

a2：$V_{DD}=-30V$, L=0.5mH, $R_G=25\Omega$, Starting $T_j=25$℃

Characteristics Curve：

Figure 1: Typ. output characteristics	Figure 2: Typ. drain-source on resistance
$I_D=f(V_{DS})$, $T_j=25$ °C; parameter: V_{GS}	$R_{DS(on)}=f(I_D)$, $T_j=25$ °C; parameter: V_{GS}

Figure 3: Typ. transfer characteristics	Figure 4: drain-source on resistance
$I_D=f(V_{GS})$, $|V_{DS}|>2|I_D|R_{DS}(on)max$;	$R_{DS(on)}=f(T_j)$, $I_D=-3A$, $V_{GS}=-10V$;

Figure 5: Typ. gate threshold voltage	Figure 6: Drain-source breakdown voltage
$V_{GS}=f(T_j)$, $V_{GS}=V_{DS}$, $I_D=-250\mu A$;	$V_{BR(DSS)}=f(T_j)$; $I_D=-250\mu A$;

Figure 7: Typ. gate charge	Figure 8: Typ. Capacitances
$V_{GS}=f(Q_g)$, $I_D=-3A$, $T_j=25\ °C$; parameter: V_{DS}	$C=f(V_{DS})$; $V_{GS}=0V$; $f=1.0$ MHz;

Figure 9: Power dissipation	Figure 10:Drain current

$P_{tot}=f(T_C);$

$I_D=f(T_C);$

Figure 11: Safe operating area	Figure 12: Typ. forward characteristics

$I_D=f(V_{DS});\ T_C=25\ °C;\ D=0;$ parameter: tp

$I_F=f(V_{SD});$

Figure 13: Max. Transient Thermal Impedance

$Z_{thJC}=f(t_p)$; parameter: D

Test Circuit & Waveform:

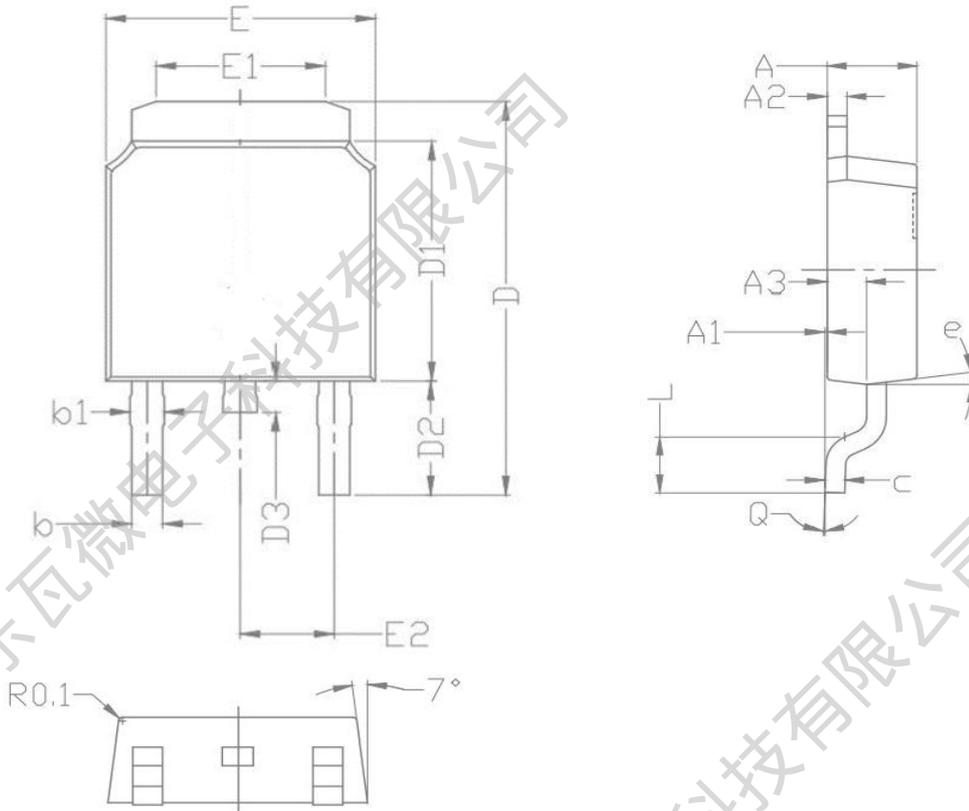**Figure 14: Gate Charge Test Circuit & Waveform**
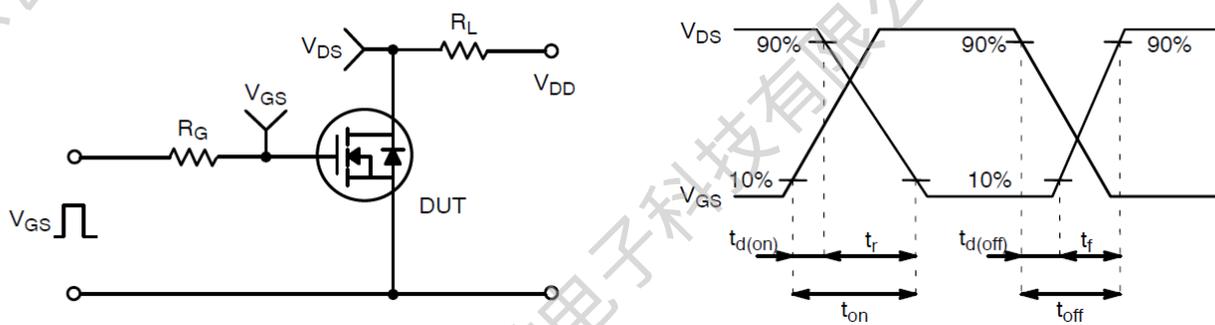
Figure 15: Resistive Switching Test Circuit & Waveforms

$$E_{AS} = \frac{1}{2} \cdot L I_{AS}^2$$
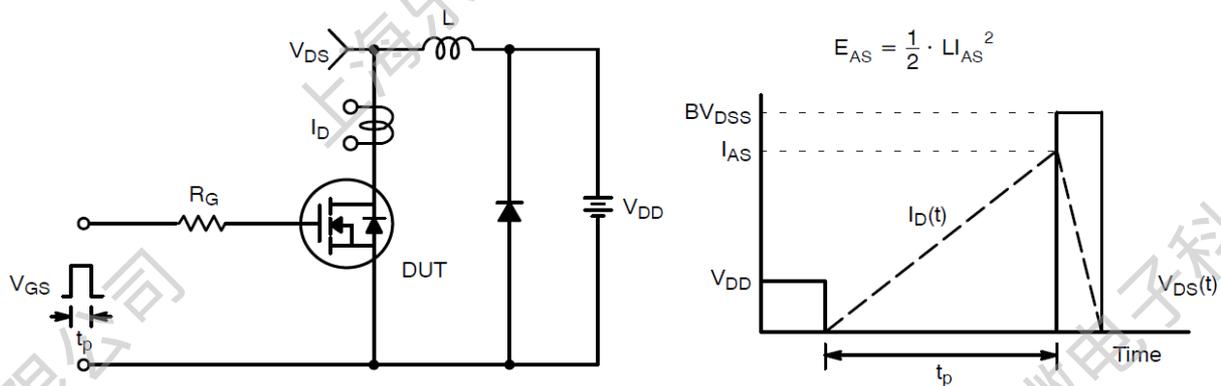
Figure 16: Unclamped Inductive Switching Test Circuit & Waveforms

Package Outline:

COMMON			
PKG	TO-252-2L		
Symbol	**Min**	**Nom**	**Max**
A	2.200	2.300	2.400
A1	0.000	0.075	0.150
A2	0.500	0.508	0.550
A3	0.960	1.010	1.060
b	0.740	0.760	0.800
b1	0.880	0.900	0.950
C	0.500	0.508	0.550
D	9.800	10.025	10.350
D1	6.050	6.100	6.180
D2	2.850	2.900	2.950
D3	0.600	0.800	1.000
E	6.550	6.600	6.700
E1	4.050	4.130	4.200
E2	2.25	2.286	2.3
L	1.400	1.500	1.600
e	7°		
Q	0°	2°	5°

Revision History:

Revison	Date	Descriptions
Rev 1.0	Apr.2023	Initial Version

Disclaimer:

The information in this document is believed to be accurate and reliable. However, no responsibility is assumed by LW-Micro for its use. All operating parameters must be designed, validated and tested to ensure they meet the requirements of your application. LW-Micro reserves the right to make any specification and/or circuitry changes without prior notification. Before starting a brand-new project, please contact LW-Micro Sales to get the most recent relevant information.

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