

P-Channel Enhancement Mode Field Effect Transistor

Product Summary

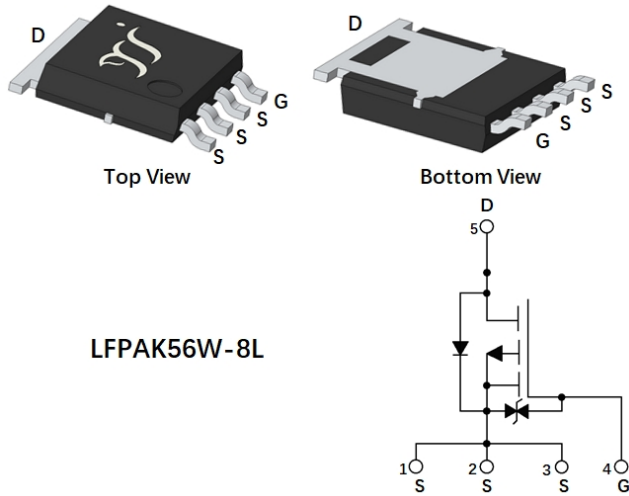
- V_{DS} -40V
- I_D -55A
- $R_{DS(ON)}$ (at $V_{GS}=-10V$) <11.5m Ω
- $R_{DS(ON)}$ (at $V_{GS}=-4.5V$) <18m Ω
- 100% EAS Tested
- 100% ∇V_{DS} Tested
- ESD Protected Up to 2KV(HBM)

General Description

- Excellent package for heat dissipation
- High density cell design for low $R_{DS(ON)}$
- Moisture Sensitivity Level 1
- Epoxy Meets UL 94 V-0 Flammability Rating
- Halogen Free
- Part no. with suffix "Q" means AEC-Q101 qualified

Applications

- Load switch
- Reverse polarity protection



LFPAK56W-8L

Limiting Values

Parameter	Conditions		Symbol	Min	Max	Unit
Drain-source Voltage			V_{DS}	-	-40	V
Gate-source Voltage (Note 1)			V_{GS}	-20	20	
Continuous Drain Current (Note 2,3)	Steady-State	$T_A=25^{\circ}\text{C}, V_{GS}=-10\text{V}$	I_D	-	-10.4	A
		$T_A=100^{\circ}\text{C}, V_{GS}=-10\text{V}$		-	-6.6	
Continuous Drain Current (Note 2,4)	Steady-State	$T_C=25^{\circ}\text{C}, V_{GS}=-10\text{V}, \text{Chip limitation}$		-	-55	
		$T_C=100^{\circ}\text{C}, V_{GS}=-10\text{V}$		-	-34.7	
Pulsed Drain Current	$T_C=25^{\circ}\text{C}, t_p \leq 10\mu\text{s}$		I_{DM}	-	-220	A
Maximum Body-Diode Continuous Current	$T_C=25^{\circ}\text{C}$		I_S		-50	
Avalanche Energy (non-repetitive)	$T_J=25^{\circ}\text{C}, V_G=-10\text{V}, R_G=25\Omega, L=0.5\text{mH}, I_{AS}=-23\text{A}$		EAS	-	132.2	mJ
Total Power Dissipation (Note 2,3)	Steady-State	$T_A=25^{\circ}\text{C}$	P_D	-	2.15	W
		$T_A=100^{\circ}\text{C}$		-	0.86	
Total Power Dissipation (Note 2,4)	Steady-State	$T_C=25^{\circ}\text{C}$		-	59.5	
		$T_C=100^{\circ}\text{C}$		-	23.8	
Junction and Storage Temperature Range			T_J, T_{STG}	-55	150	$^{\circ}\text{C}$

Thermal Resistance

Parameter		Symbol	Typ	Max	Units
Thermal Resistance Junction-to-Ambient (Note 3)	Steady-State	$R_{\theta JA}$	-	58	$^{\circ}\text{C/W}$
Thermal Resistance Junction-to-Case	Steady-State	$R_{\theta JC}$	-	2.1	



YJYA011P04AKHQ

■ Electrical Characteristics

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Static Parameter						
Drain-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250μA, T _j =25°C	-40	-	-	V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V, T _j =25°C	-	-	-1	μA
		V _{DS} =-40V, V _{GS} =0V, T _j =125°C	-	-	-100	
Gate-Source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V, T _j =25°C	-	-	±10	μA
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA, T _j =25°C	-1.2	-1.7	-2.2	V
Static Drain-Source On-Resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-34A, T _j =25°C	-	9	11.5	mΩ
		V _{GS} =-4.5V, I _D =-10A, T _j =25°C	-	12	18	mΩ
Diode Forward Voltage	V _{SD}	I _S =-34A, V _{GS} =0V, T _j =25°C	-	-0.93	-1.2	V
Gate Resistance	R _G	f=1MHz, T _j =25°C	-	6.6	-	Ω
Dynamic Parameters						
Input Capacitance	C _{iss}	V _{DS} =-20V, V _{GS} =0V, f=1MHz, T _j =25°C	-	2890	4335	pF
Output Capacitance	C _{oss}		-	308	-	
Reverse Transfer Capacitance	C _{rss}		-	250	-	
Switching Parameters						
Total Gate Charge	Q _g	V _{GS} =-10V, V _{DS} =-20V, I _D =-34A, T _j =25°C	-	61.4	-	nC
Gate-Source Charge	Q _{gs}		-	11.9	-	
Gate-Drain Charge	Q _{gd}		-	9.6	-	
Reverse Recovery Charge	Q _{rr}	I _F =-34A, di/dt=100A/μs, V _{GS} =0V, V _R =-20V, T _j =25°C	-	25.4	-	nC
Reverse Recovery Time	t _{rr}		-	34.5	-	ns
Turn-on Delay Time	t _{D(on)}	V _{GS} =-10V, V _{DS} =-20V, I _D =-34A, R _{GEN} =3Ω, T _j =25°C	-	10.5	-	ns
Turn-on Rise Time	t _r		-	51	-	
Turn-off Delay Time	t _{D(off)}		-	75	-	
Turn-off Fall Time	t _f		-	46	-	

Note:

- $V_{GS}=-20V/+10V$ according AEC-Q101 at $T_j=150^\circ C$.
- The entire application environment impacts the thermal resistance values shown, they are not constants and are only valid for the particular conditions noted.
- The value of $R_{\theta JA}$ is measured with the device mounted on the 40mm*40mm*1.1mm single layer FR-4 PCB board with 1 in² pad of 2oz. Copper, in the still air environment with $T_A=25^\circ C$. The maximum allowed junction temperature of $150^\circ C$. The value in any given application depends on the user's specific board design.
- Thermal resistance from junction to soldering point (on the exposed drain pad).



■ Typical Electrical and Thermal Characteristics Diagrams

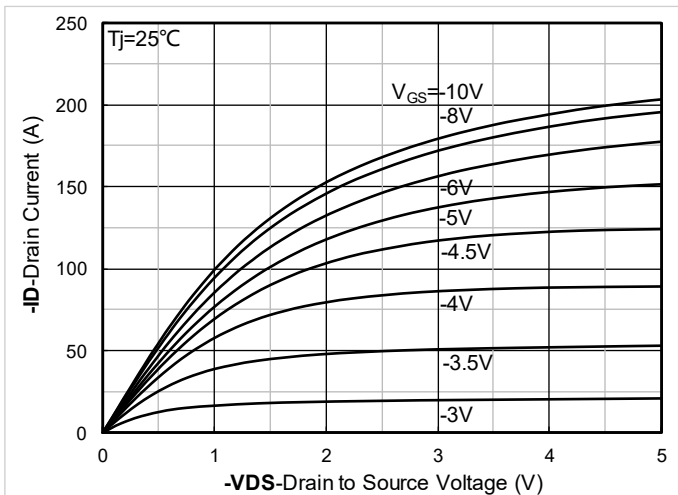


Figure 1. Output Characteristics; typical values

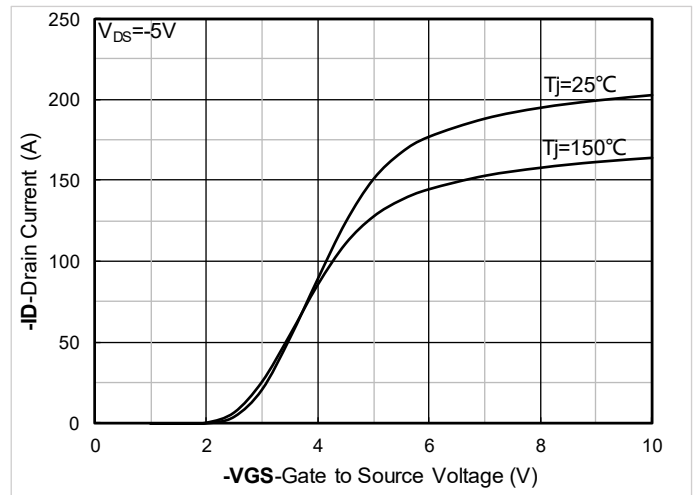


Figure 2. Transfer Characteristics; typical values

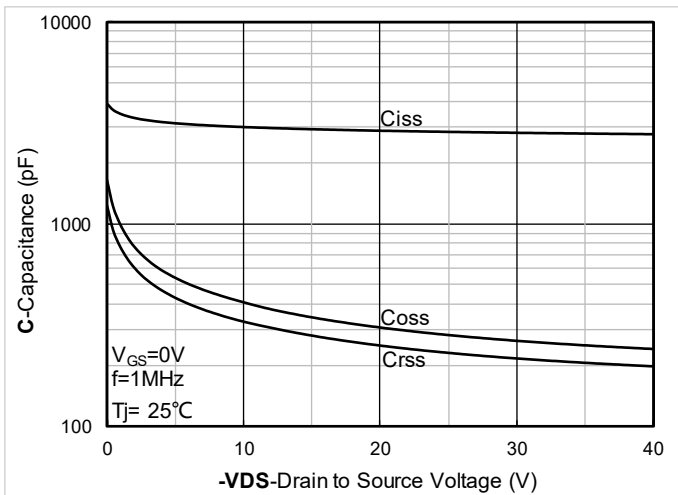


Figure 3. Capacitance Characteristics; typical values

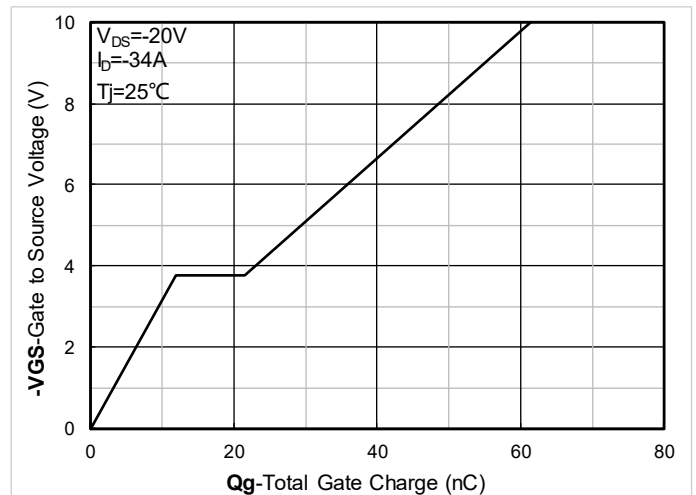


Figure 4. Gate Charge; typical values

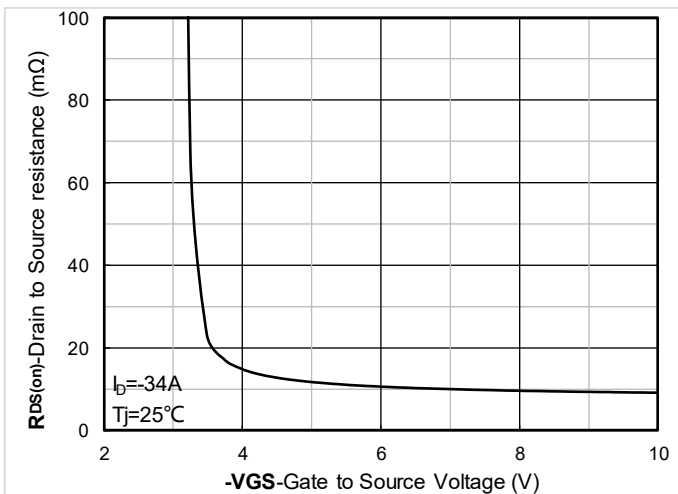


Figure 5. On-Resistance vs. Gate to Source Voltage; typical values

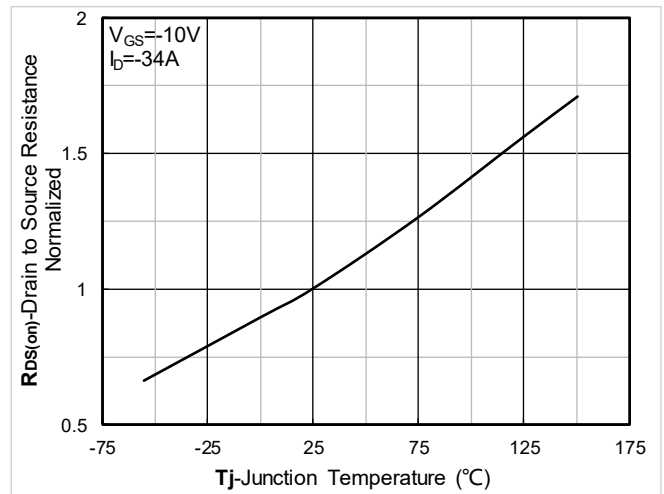


Figure 6. Normalized On-Resistance

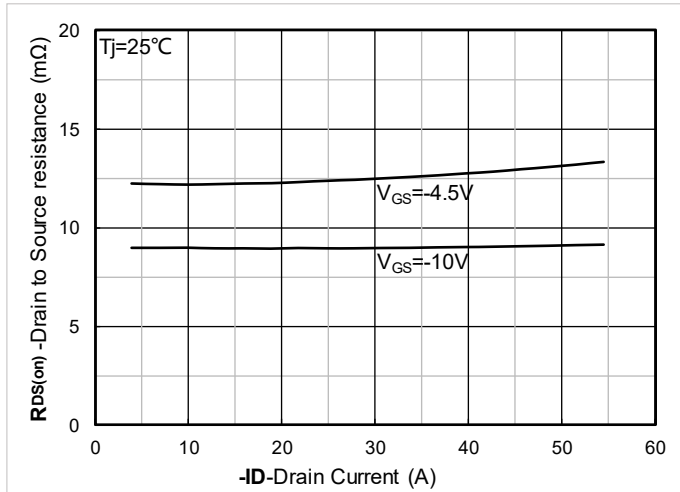


Figure 7. RDS(on) vs. Drain Current; typical values

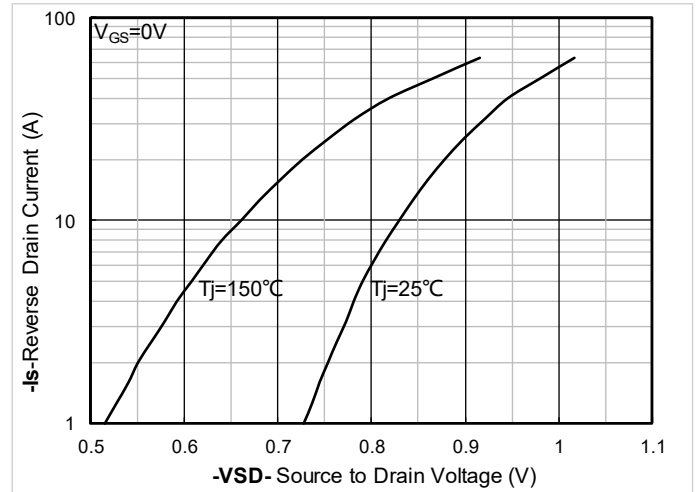


Figure 8. Forward characteristics of reverse diode; typical values

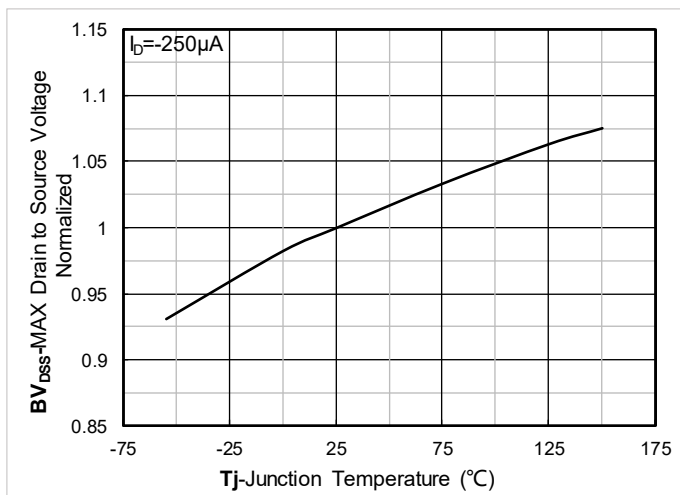


Figure 9. Normalized breakdown voltage

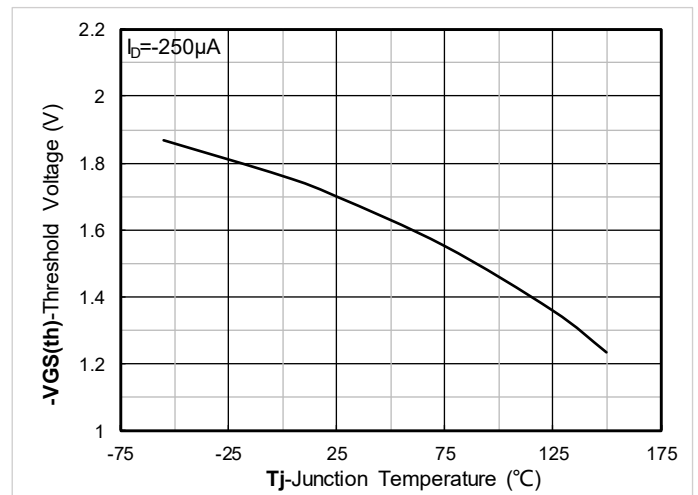


Figure 10. Gate Threshold voltage; typical values

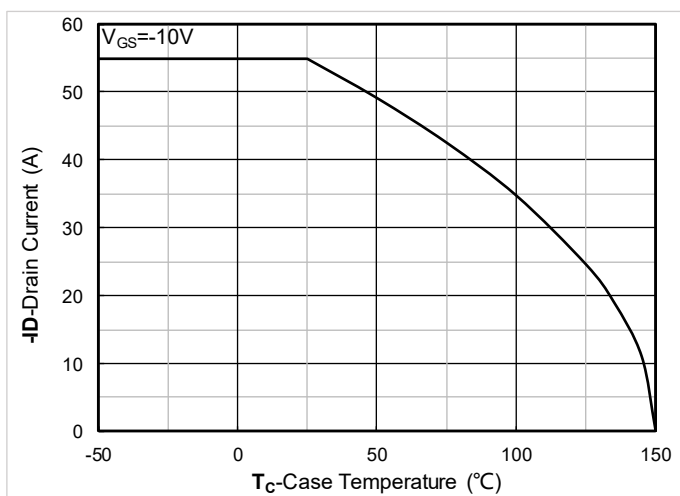


Figure 11. Current dissipation

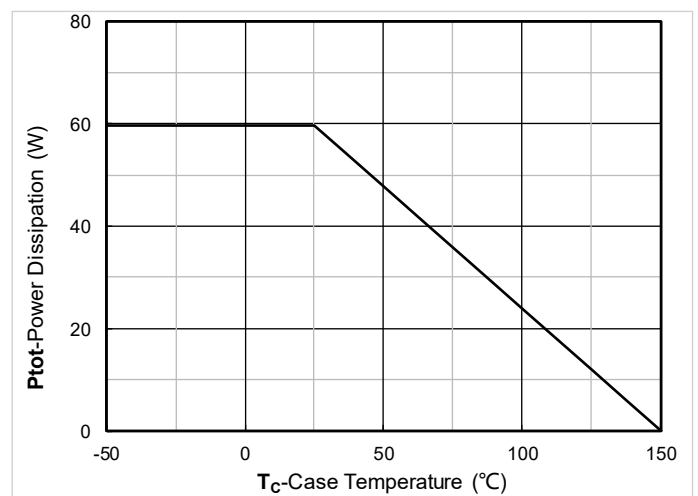


Figure 12. Power dissipation

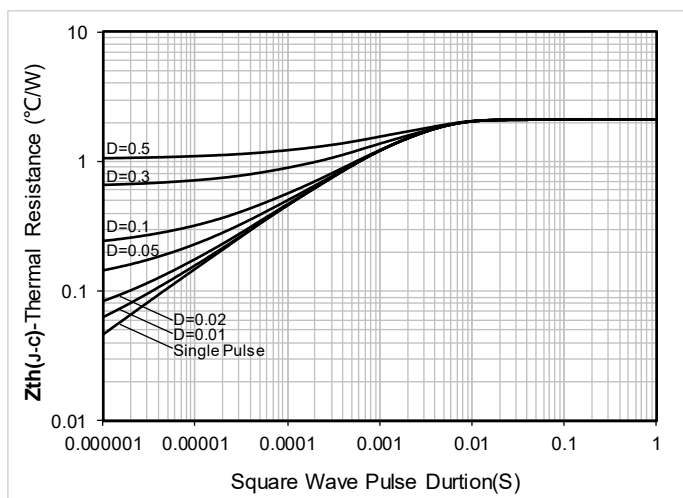


Figure 13. Maximum Transient Thermal Impedance

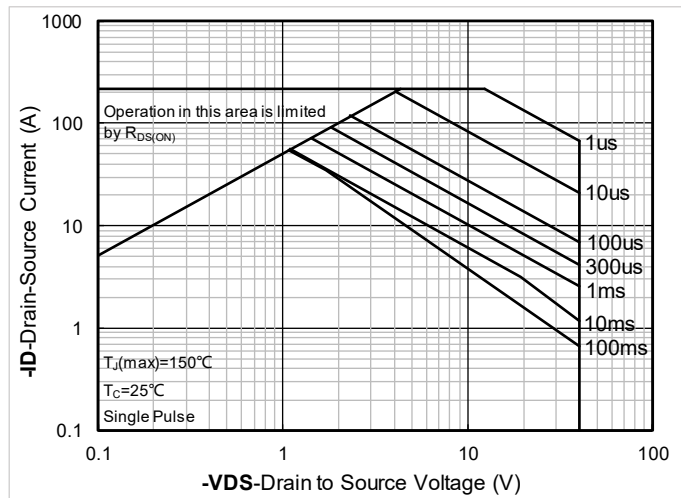
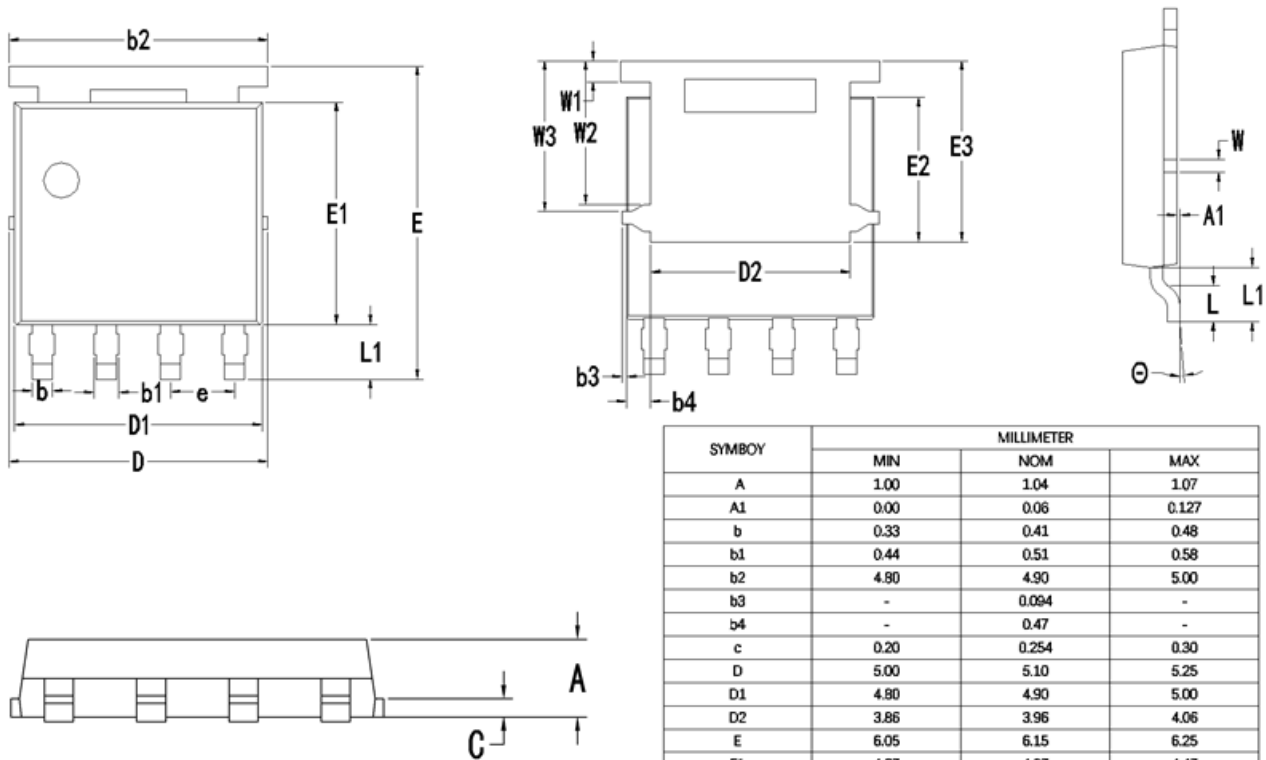


Figure 14. Safe Operation Area

■ LFPAK56W-8L-A-1.04MM Package information



Note:

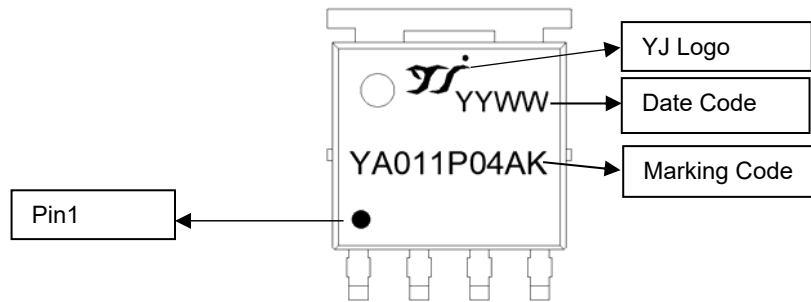
1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.10\text{mm}$.
3. The pad layout is for reference purposes only.

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.00	1.04	1.07
A1	0.00	0.06	0.127
b	0.33	0.41	0.48
b1	0.44	0.51	0.58
b2	4.80	4.90	5.00
b3	-	0.094	-
b4	-	0.47	-
c	0.20	0.254	0.30
D	5.00	5.10	5.25
D1	4.80	4.90	5.00
D2	3.86	3.96	4.06
E	6.05	6.15	6.25
E1	4.27	4.37	4.47
E2	2.75	2.85	2.95
E3	3.46	3.56	3.66
e	1.27		
L	0.62	0.72	0.82
L1	0.92	1.07	1.22
W	-	0.23 BSC	-
W1	-	0.41 BSC	-
W2	-	2.82 BSC	-
W3	-	2.96 BSC	-
θ	0°		10°



YJYA011P04AKHQ

■ Marking Information



Note:

1. All marking is at middle of the product body
2. All marking is in laser printing
3. YA011P04AK is marking code, YYWW is date code, "YY" is year, "WW" is week
4. Body color: Black



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