

Features

- Uses PingWei advanced PerfectMOS2 technology
- Extremely low on-resistance $R_{DS(on)}$
- Excellent $Q_g \times R_{DS(on)}$ product(FOM)
- Qualified according to AEC-Q101 criteria

Benefits

- High robustness and reliability
- Increases maximum current capability
- Low power loss, high power density
- Easy paralleling

Applications

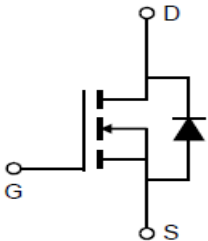
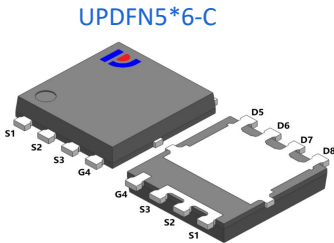
- General Automotive Applications
- Motor Drivers
- Switching Mode Power Supply



100% DVDS Tested
100% Avalanche Tested

Product Summary

V_{DS}	40V
$R_{DS(on)}@10V$ typ	0.67mΩ
I_D (Silicon)	310A



Package Marking and Ordering Information

Part #	Marking	Package	Packing	Reel Size	Tape Width	Qty
PWC009N04UESQ	C009N04UESQ	UPDFN5*6-C	Tape&Reel	13 inches	12mm	5000pcs

Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Drain-source voltage	V_{DS}	40	V
Continuous drain current $T_C = 25^{\circ}C$ (Silicon limit) $T_C = 100^{\circ}C$ (Silicon limit) $T_C = 25^{\circ}C$ (Package limit) $T_a = 25^{\circ}C$ (Note1)	I_D	310 219 150 40	A
Pulsed drain current ($T_C = 25^{\circ}C, t_p = 100\mu s$)	$I_{D\ pulse}$	600	A
Avalanche energy, single pulse ($L=0.5mH$)	E_{AS}	635	mJ
Gate-Source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25^{\circ}C$	P_{tot}	156	W
Operating junction and storage temperature	T_j, T_{stg}	-55...+175	$^{\circ}C$
Reflow soldering temperature (10s)	T_{sold}	260	$^{\circ}C$

Thermal Resistance

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Thermal resistance, junction – case.	RthJC	-	-	1.0	°C/W	-
Thermal resistance, junction - ambient	RthJA	-	-	57	°C/W	Note 1

Electrical Characteristic (at Tj = 25 °C, unless otherwise specified)

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		

Static Characteristic

Drain-source breakdown voltage	BV _{DSS}	40	-	-	V	V _{GS} =0V, I _D =250uA
Gate threshold voltage	V _{GS(th)}	2	-	3	V	V _{DS} =V _{GS} , I _D =250uA
Zero gate voltage drain current	I _{DSS}	-	-	1 100	μA	V _{DS} =40V, V _{GS} =0V T _j =25°C T _j =150°C
Gate-source leakage current	I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
Drain-source on-state resistance	R _{DS(on)}	-	0.67	0.9	mΩ	V _{GS} =10V, I _D =75A
Transconductance	g _{fs}	-	130	-	S	V _{DS} =5V, I _D =50A

Dynamic Characteristic

Input Capacitance	C _{iss}	-	7184	14368	pF	V _{GS} =0V, V _{DS} =20V, f=1MHz
Output Capacitance	C _{oss}	-	2326	3722		
Reverse Transfer Capacitance	C _{rss}	-	60	96		
Gate Total Charge	Q _G	-	98	195	nC	V _{DS} =20V, I _D =30A V _{GS} =10V
Gate-Source charge	Q _{GS}	-	35	70		
Gate-Drain charge	Q _{GD}	-	10	20		
Turn-on delay time	t _{d(on)}	-	18	-	ns	V _{GS} =10V, V _{DD} =20V, R _{G_ext} =1.6Ω, I _D =20A
Rise time	t _r	-	24	-		
Turn-off delay time	t _{d(off)}	-	67	-		
Fall time	t _f	-	20	-		
Gate resistance	R _G	-	2.9	-	Ω	V _{GS} =0V, V _{DS} =0V, f=1MHz

Body Diode Characteristic

Parameter	Symbol	Value			Unit	Test Condition
		min.	typ.	max.		
Body Diode Forward Voltage	V_{SD}	-	-	1.2	V	$V_{GS}=0V, I_{SD}=75A$
Body Diode Continuous Forward Current	I_S	-	-	150	A	TC = 25°C
Body Diode Pulsed Current	I_S pulse	-	-	600	A	TC = 25°C, $t_p = 100\mu s$
Body Diode Reverse Recovery Time	t_{rr}	-	50	-	ns	IF=50A, dI/dt=100A/μs
Body Diode Reverse Recovery Charge	Q_{rr}	-	53	-	nC	

Note 1: 1 inch², 2oz single copper FR-4 PCB.

Typical Performance Characteristics

Fig 1: Output Characteristics

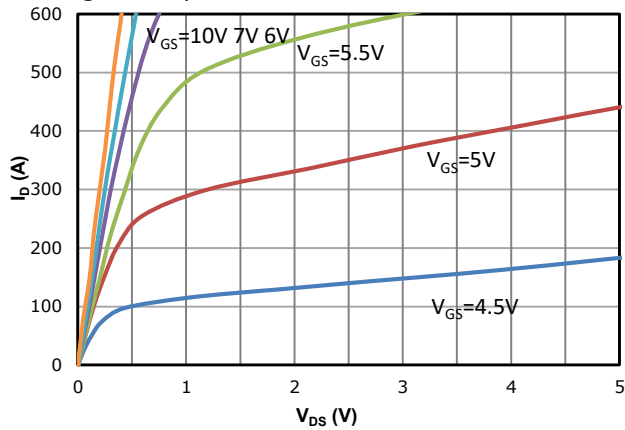


Fig 2: Transfer Characteristics

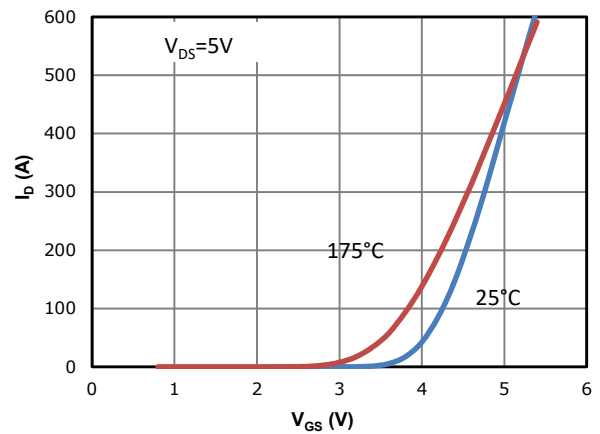


Fig 3: $R_{DS(on)}$ vs Drain Current and Gate Voltage

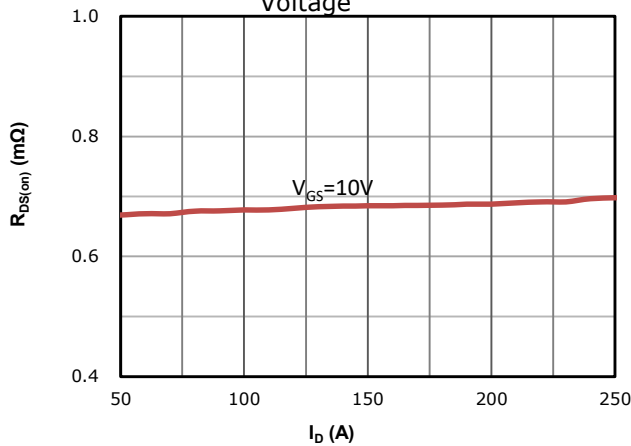


Fig 4: $R_{DS(on)}$ vs Gate Voltage

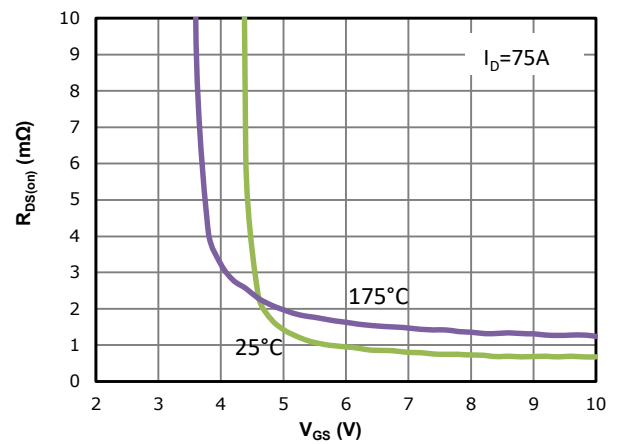


Fig 5: $R_{DS(on)}$ vs. Temperature

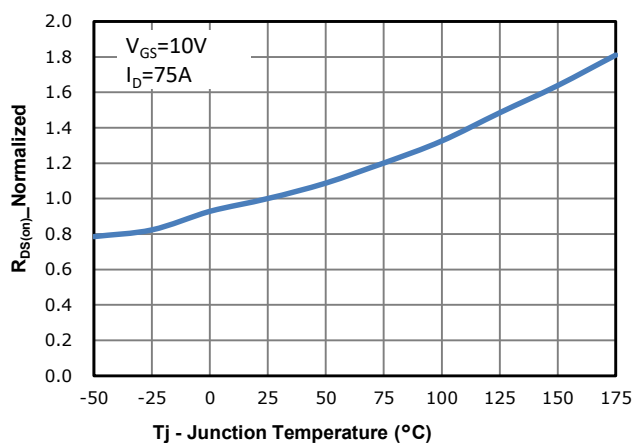


Fig 6: $V_{GS(th)}$ vs. Temperature

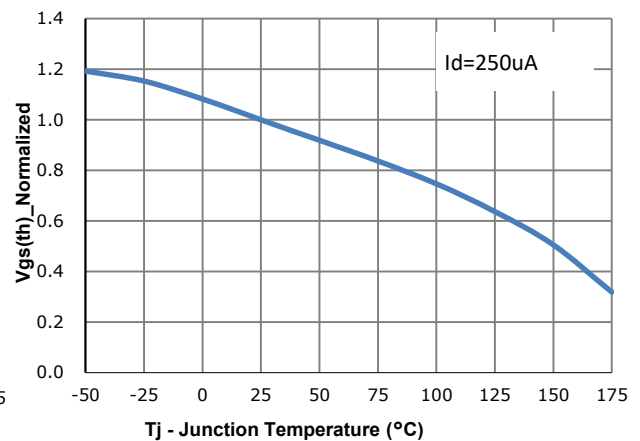


Fig 7: BVdss vs. Temperature

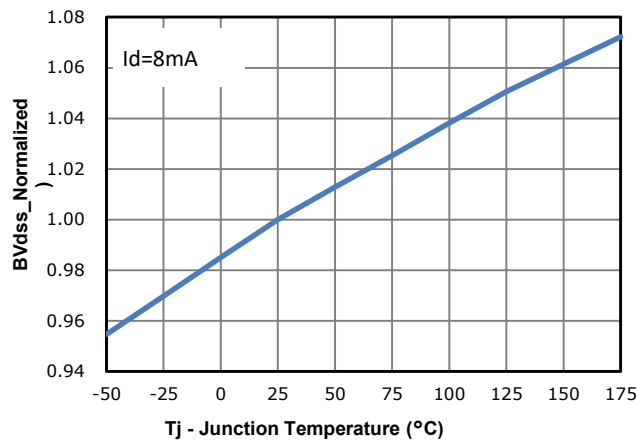


Fig 8: Capacitance Characteristics

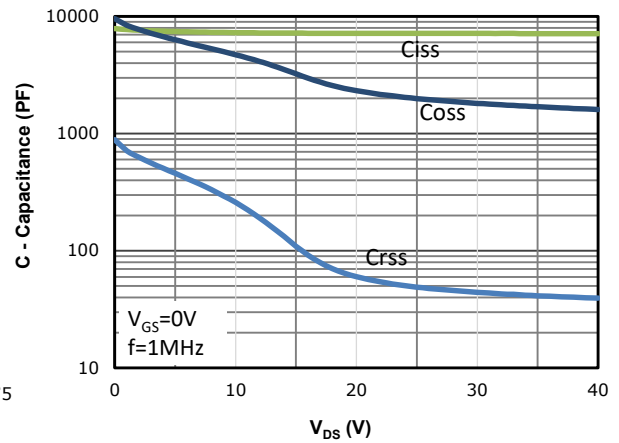


Fig 9: Gate Charge Characteristics

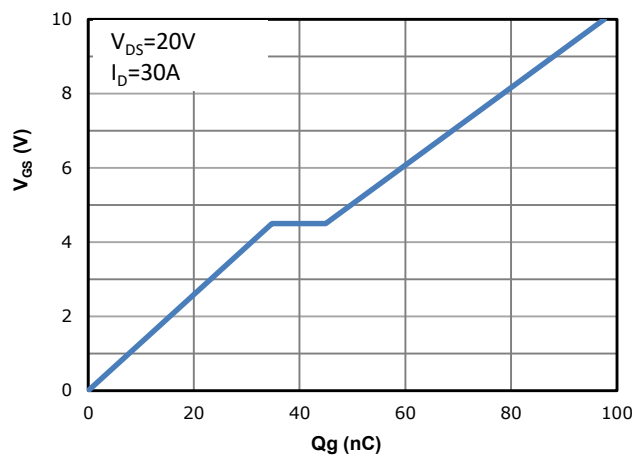


Fig 10: Body-diode Forward Characteristics

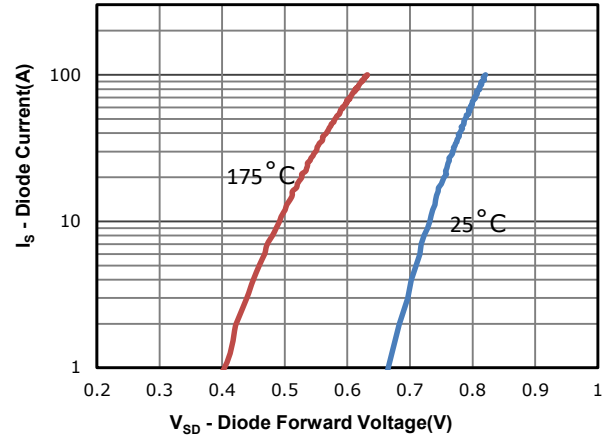


Fig 11: Power Dissipation

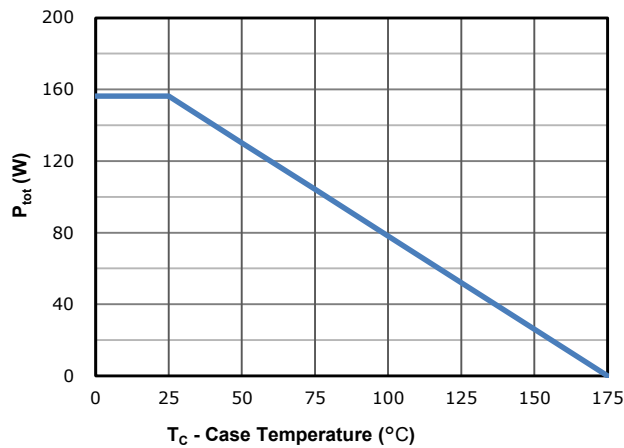


Fig 12: Drain Current Derating

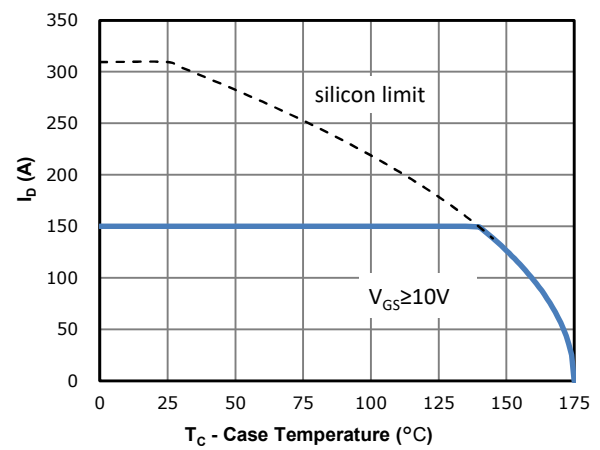


Fig 13: Safe Operating Area

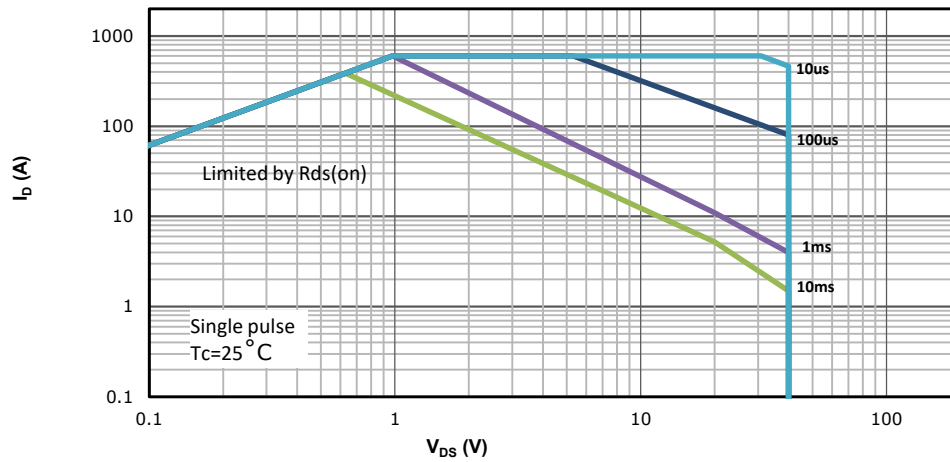
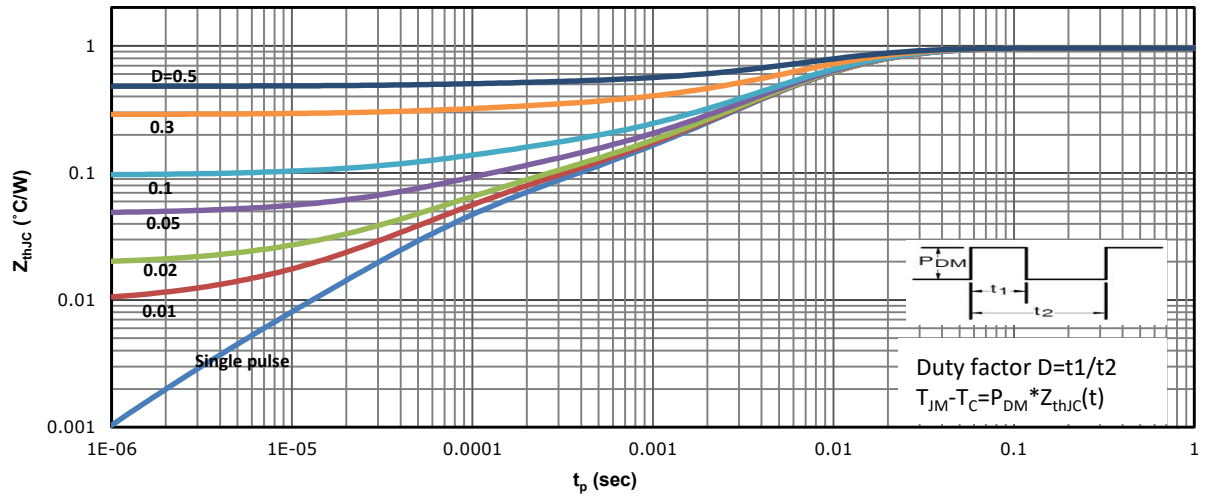
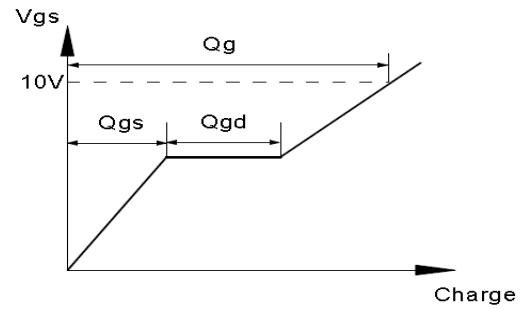


Fig 14: Max. Transient Thermal Impedance

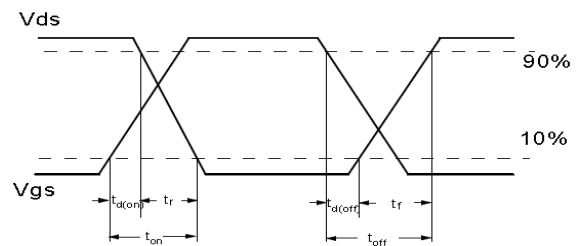


Test Circuit & Waveform

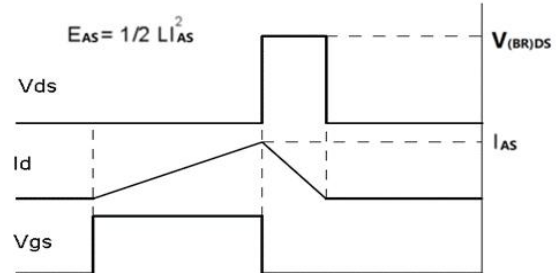
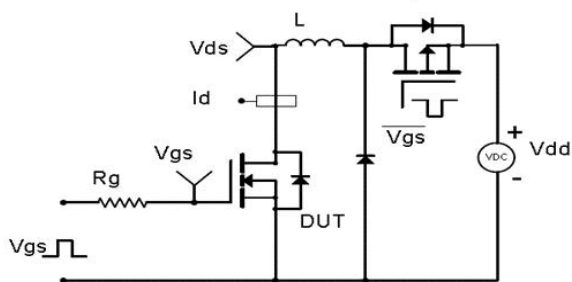
Gate Charge Test Circuit & Waveform



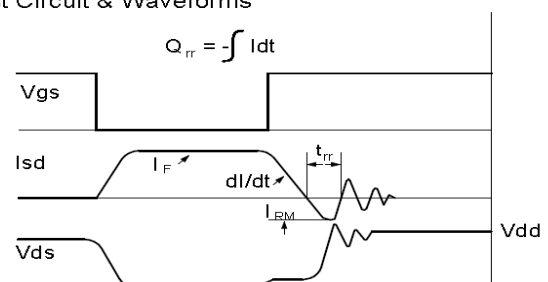
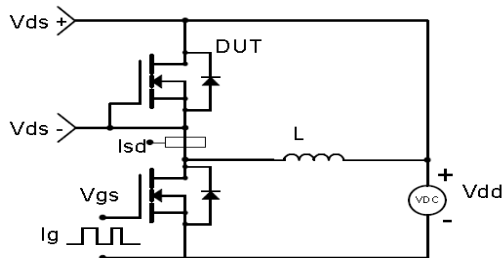
Resistive Switching Test Circuit & Waveforms



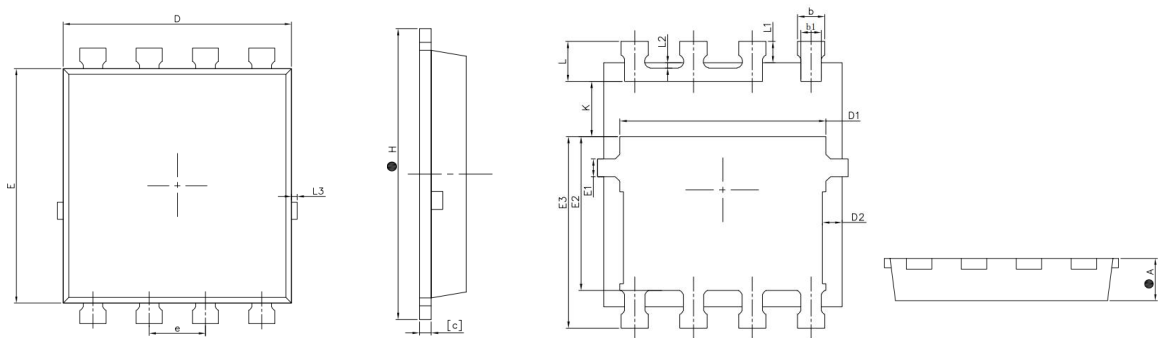
Unclamped Inductive Switching (UIS) Test Circuit & Waveforms



Diode Recovery Test Circuit & Waveforms



Package Outline: UPDFN5*6-C



SYMBOL	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.90	1.10	0.035	0.043
b	0.49	0.69	0.019	0.027
b1	0.34	0.54	0.013	0.021
c	0.20	0.30	0.008	0.012
D	4.95	5.35	0.195	0.211
D1	4.45	4.85	0.175	0.191
D2	0.225	0.625	0.009	0.025
E	5.28	5.68	0.208	0.224
E1	0.25	0.60	0.010	0.024
E2	3.20	3.70	0.126	0.146
E3	4.05	4.55	0.159	0.179
e	1.27		0.050	
H	6.19	6.69	0.244	0.263
L	0.65	1.15	0.026	0.045
L1	0.28	0.68	0.011	0.027
L2	0.12		0.005	
L3	-	0.23	-	0.009
K	1.04	1.44	0.041	0.057

Revision History

Revision	Date	Major changes
1.0	2025/6/4	Release of Formal Version
1.1	2025/12/15	Update Package Outline L2&L3

Disclaimer

Any and all semiconductor products have certain probability to fail or malfunction, which may result in personal injury, death or property damage. Customer are solely responsible for providing adequate safe measures when design their systems.

The product is not intended for use in applications that require extraordinary levels of quality and reliability, such as aviation/aerospace and life-support devices or systems.

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