

SuperMOS – PDFN3*3-8L -30V BV_{DSS}, 9mΩ R_{DS(on)}, P-channel MOSFET

1. Description

The ESN7409 is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product ESN7409 is Pb-free.

2. Features

- -30V, R_{DS(ON)}=9.0mΩ(TYP.) @V_{GS}=-10V
R_{DS(ON)}=12.5mΩ(TYP.) @V_{GS}=-4.5V
- Fast Switching
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

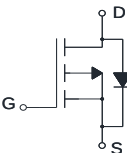
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED!

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel size
ESN7409	PDFN3*3-8L	ESN7409/LOT	Halogen free	Tape & Reel	5,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
4	Gate	Note b 	
1/2/3	Source		
5/6/7/8	Drain		

6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	-30	V
Gate-Source Voltage		V_{GS}	±25	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	-36.70	A
	$T_C=75^{\circ}\text{C}$		-28.43	
Maximum Power Dissipation	$T_C=25^{\circ}\text{C}$	P_D	29.76	W
	$T_C=75^{\circ}\text{C}$		17.86	
Pulsed Drain Current ^a		I_{DM}	-146.79	A
Operating Junction Temperature		T_J	150	°C
Storage Temperature Range		T_{stg}	-55 to +150	°C

Thermal resistance ratings

Parameter		Symbol	Typical	Unit
Junction-to-Ambient Thermal Resistance	$t \leq 10 \text{ s}$	$R_{\theta JA}$	40	°C/W
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	4.2	

Note:

a: Repetitive rating, pulse width limited by junction temperature, $t_p=10\mu\text{s}$, Duty Cycle=1%

b: This diagram is only an electrical schematic, and the actual pin size is based on POD

Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-30			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-30V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±25V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.4	-2.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-12A		9.0	13	mΩ
		V _{GS} =-4.5V, I _D =-7A		12.5	18	
Forward Trans conductance	g _{FS}	V _{DS} =-5.0V, I _D =-6A			100	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =-15V		1780		pF
Output Capacitance	C _{OSS}			235		
Reverse Transfer Capacitance	C _{RSS}			200		
Gate Resistance	R _g	f=1MHZ		2.5		Ω
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-20A		46		nC
Gate-to-Source Charge	Q _{GS}			1.0		
Gate-to-Drain Charge	Q _{GD}			1.4		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-15V, R _L =1Ω, R _G =3Ω		8		ns
Rise Time	t _r			27		
Turn-Off Delay Time	t _{d(OFF)}			68		
Fall Time	t _f			39		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-1.0A		-0.75	-1.5	V

7. Typical Characteristic

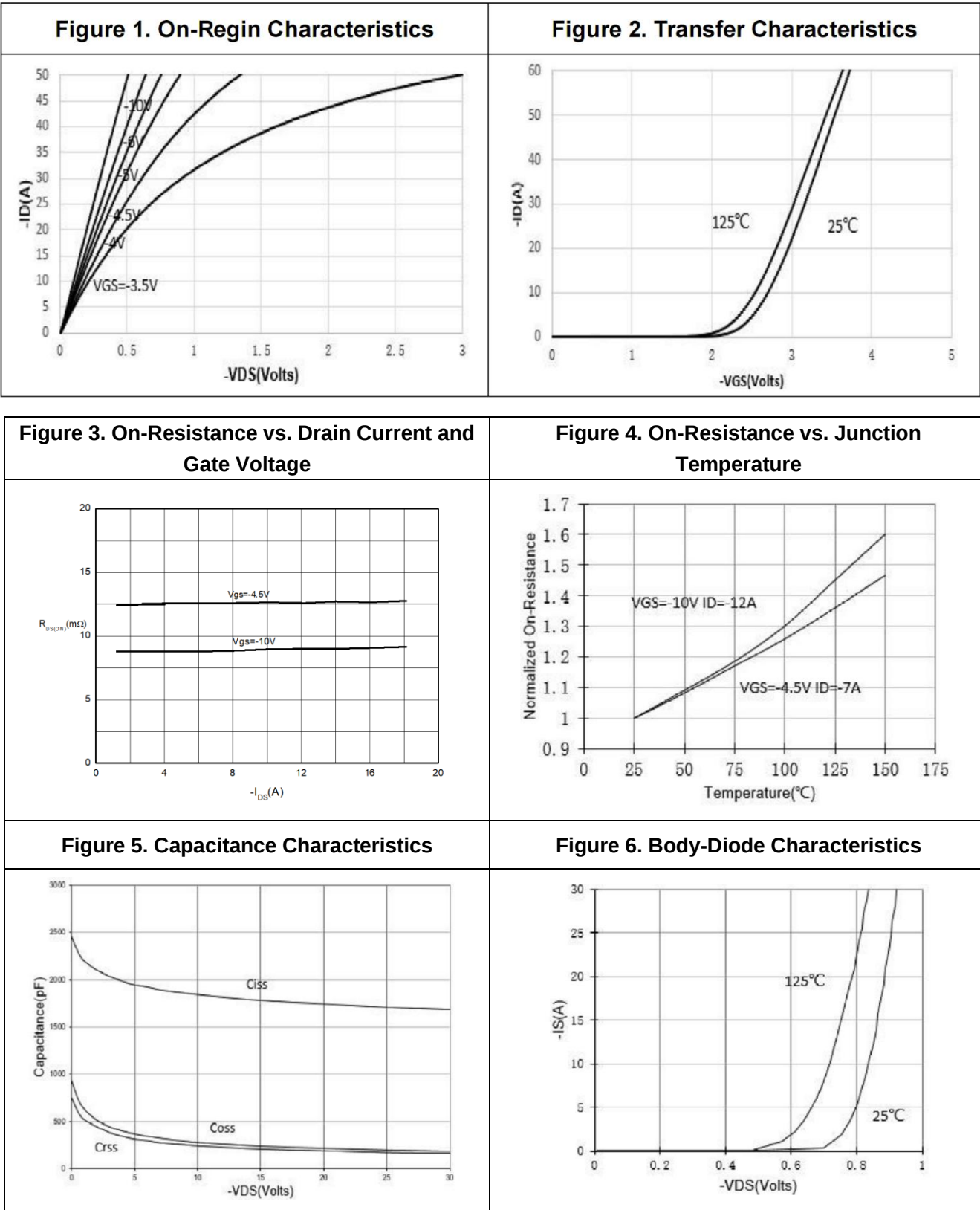
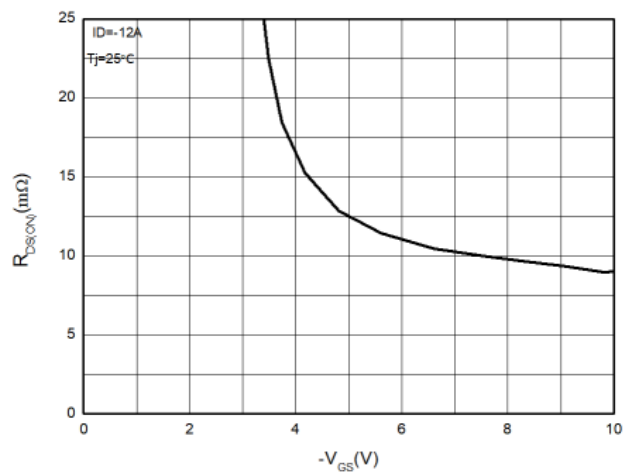
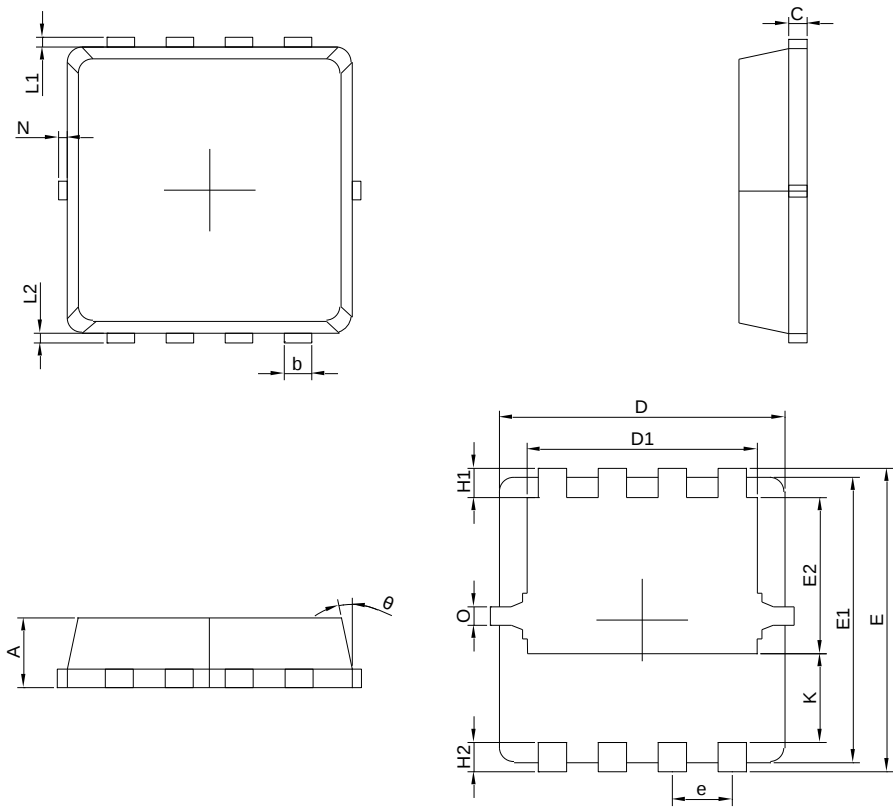


Figure 7. On-Resistance vs. Gate-Source Voltage



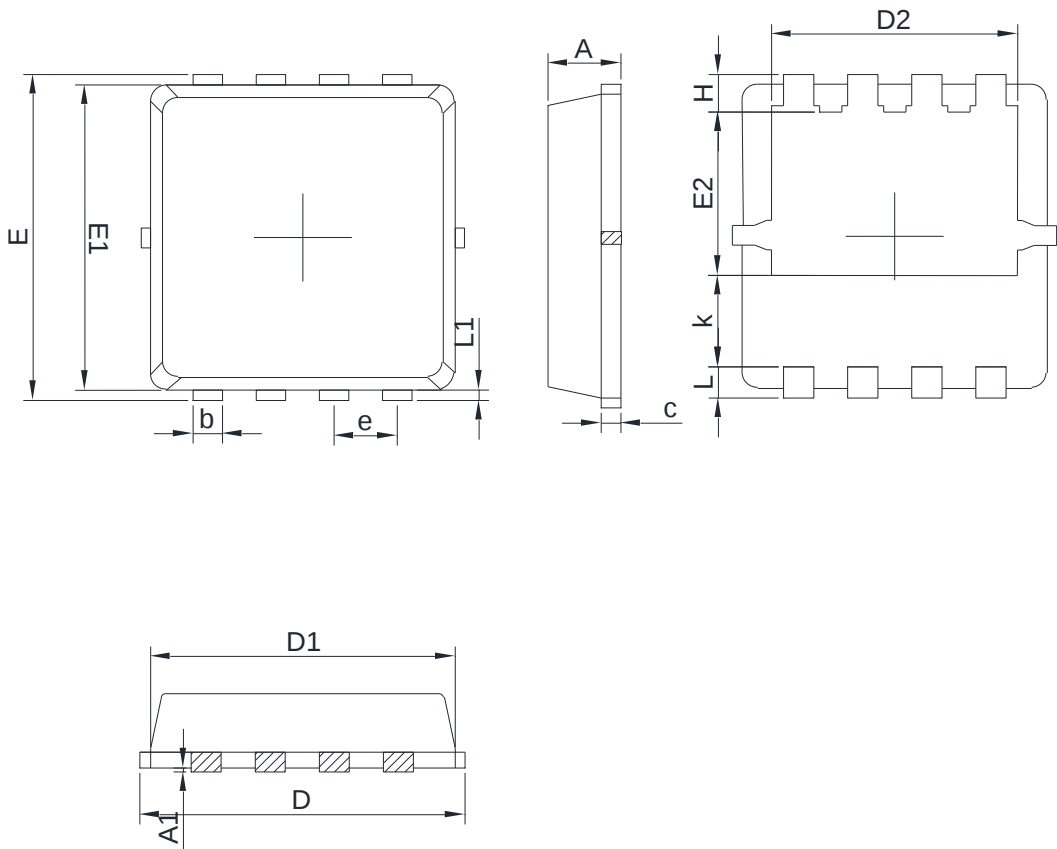
8. Dimension (PDFN3*3-8L)

POD A(J)



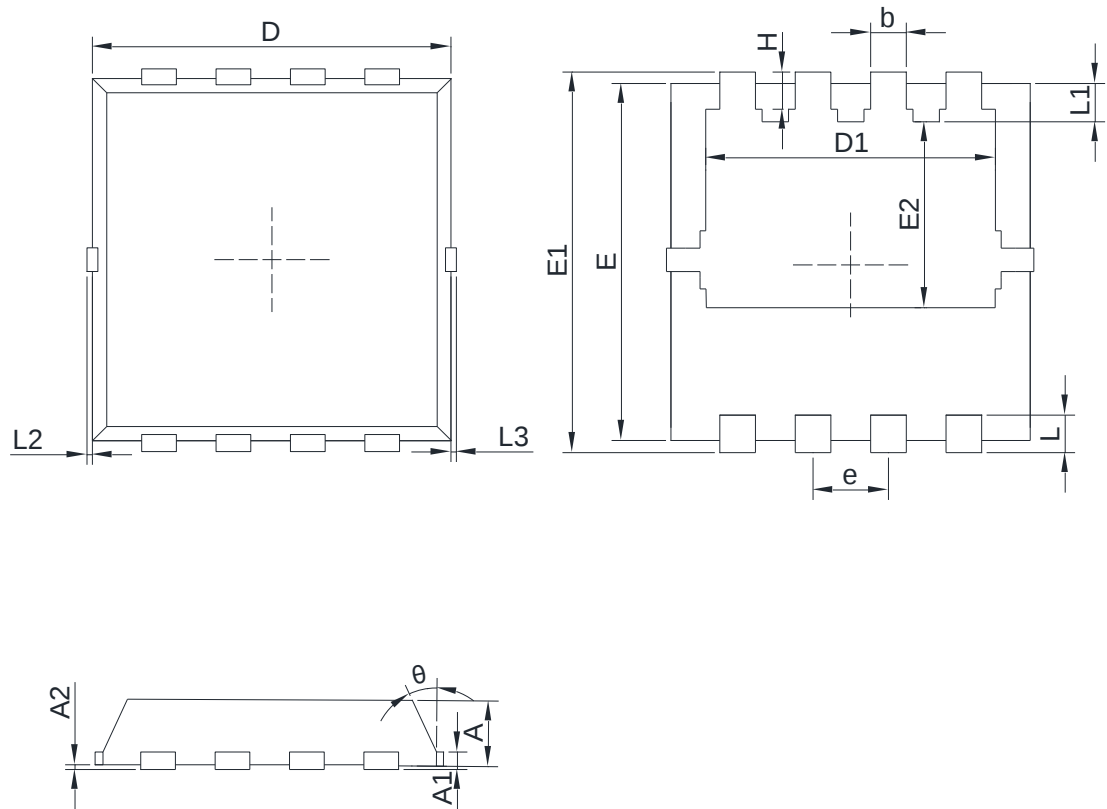
Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0. 65	0.75	0.85	e	0. 65 BSC.		
b	0. 25	0. 30	0. 35	H1	0. 21	0.31	0. 41
C	0. 15	0. 20	0. 25	H2	0. 30	0. 40	0.50
D	3. 00	3.10	3. 20	K	0.78	0. 88	0. 98
D1	2. 40	2. 50	2. 60	L1/L2	0. 10 REF.		
E	3. 20	3. 30	3. 40	θ	11°	12°	13°
E1	3. 00	3.10	3. 20	N	0	-	0.15
E2	1. 60	1.70	1.80	O	0. 2 REF.		

POD B(Q)



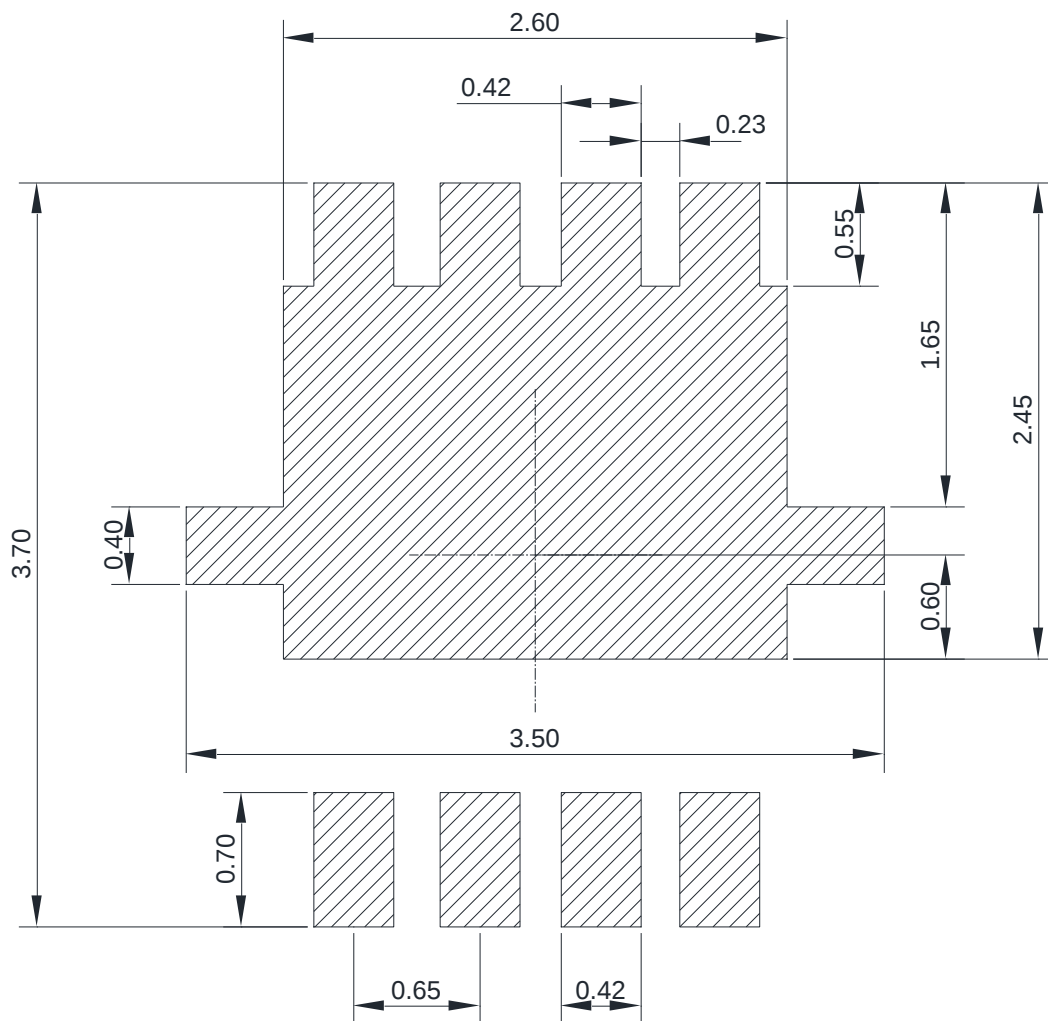
Symbol	Dimensions in Millimeters			Symbol	Dimensions in Millimeters		
	MIN	NOM	MAX		MIN	NOM	MAX
A	0.65	0.75	0.85	H	0.385	0.485	0.585
A1			0.05	k	0.800		
b	0.20	0.30	0.40	L	0.30	0.40	0.50
c	0.10	0.15	0.25	e	0.65BCS		
D	3.05	3.20	3.35	L1	0.025	0.125	0.225
D1	3.05	3.15	3.25	D2	2.300	2.450	2.600
E	3.25	3.35	3.45	E2	1.360	1.510	1.660
E1	3.00	3.10	3.20				

POD C(X)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	0.700	0.800	0.900	L	0.300	0.400	0.500
A1	0.152 REF			L1	0.180	0.330	0.480
A2	0~0.05			L2	0~0.100		
D	3.000	3.100	3.200	L3	0~0.100		
D1	2.300	2.450	2.600	H	0.315	0.415	0.515
E	2.900	3.000	3.100	b	0.200	0.300	0.400
E1	3.150	3.300	3.450	e	0.550	0.650	0.750
E2	1.320	1.520	1.720	θ	8°	10°	12°

9. Recommended Soldering Footprint



DIMENSIONS: MILLIMETERS

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