

SuperMOS - SOP8 -40V BV_{DSS}, 10mΩ R_{DS(on)}, P-channel MOSFET

1. Description

The ESQQ13P04 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 ESQQ13P04 is Pb-free.

2. Features

- -40V, R_{DS(ON)}=10mΩ(TYP.) @V_{GS}=-10V
R_{DS(ON)}=13.6mΩ(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
ESQQ13P04	SOP8	ES4485/lot	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
4	Gate	Note e	
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}	-40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}C$	I_D	-10.64	A
	$T_C=100^{\circ}C$		-6.73	
Maximum Power Dissipation	$T_C=25^{\circ}C$	P_D	2.5	W
Pulsed Drain Current ^a		I_{DM}	-42.56	A
Avalanche Current, Single Pulsed ^b		I_{AS}	-20	A
Avalanche Energy, Single Pulsed ^b		E_{AS}	100	mJ
Operating Junction Temperature		T_J	-55 to +150	°C
Storage Temperature Range		T_{stg}	-55 to +150	°C
Junction-to-Ambient Thermal Resistance ^c		$R_{\theta JA}$	50	°C/W

Note:

a: Repetitive rating; pulse width limited by maximum junction temperature.

b: EAS condition: $T_J=25^{\circ}C$, $V_{DD}=-20V$, $V_G=-10V$, $L=0.5mH$, $R_g=25\Omega$.

c: $R_{\theta JA}$ is measured with the device mounted on a 1inch² pad of 2oz copper FR4 PCB.

d: Pulse Test: Pulse Width ≤ 300us, Duty Cycle ≤ 0.5%.

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

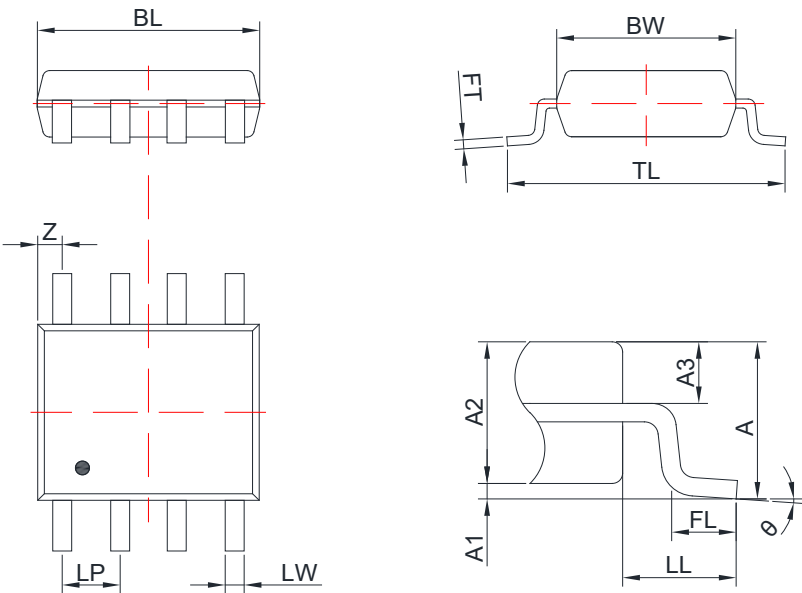
Electrical Characteristics

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	-40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} =0V, V _{DS} =-40V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{GS} =±20V, V _{DS} =0V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.6	-2.5	V
Drain-to-source On-resistance ^d	R _{DS(on)}	V _{GS} =-10V, I _D =-8A		10	13	mΩ
		V _{GS} =-4.5V, I _D =-5A		13.6	17.7	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V, f=1MHz		2100		pF
Output Capacitance	C _{OSS}			281		
Reverse Transfer Capacitance	C _{RSS}			231		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =0 to -10V, V _{DS} =-20V, I _D =-11A		35		nC
Gate-to-Source Charge	Q _{GS}			6.2		
Gate-to-Drain Charge	Q _{GD}			7.3		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DD} =-20V, I _D =-11A, R _G =2.5Ω		10		ns
Rise Time	t _r			20		
Turn-Off Delay Time	t _{d(OFF)}			51		
Fall Time	t _f			28		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _{SD} =-11A			-1.2	V

7. Dimension (SOP8)

POD A(Y)



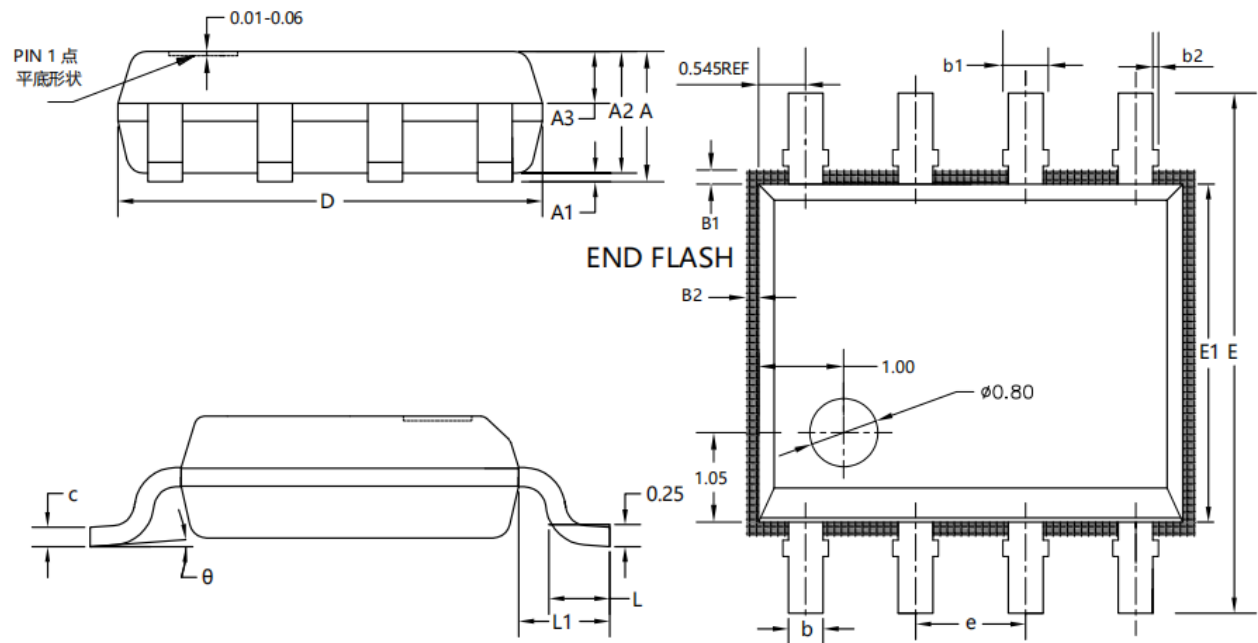
COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
A	1.75		FL	0.50	0.80
A1	0.05	0.15	LP	1.25	1.30
A2	1.40	1.50	LL	1.1 BSC	
A3	0.623 BSC		LW	0.38	0.43
BL	4.92	5.08	TL	5.90	6.10
BW	3.70	4.10	Z	0.54	
FT	0.20	0.21	θ	0°	8°

ESQQ13P04

Rev-1.2

POD B(C)



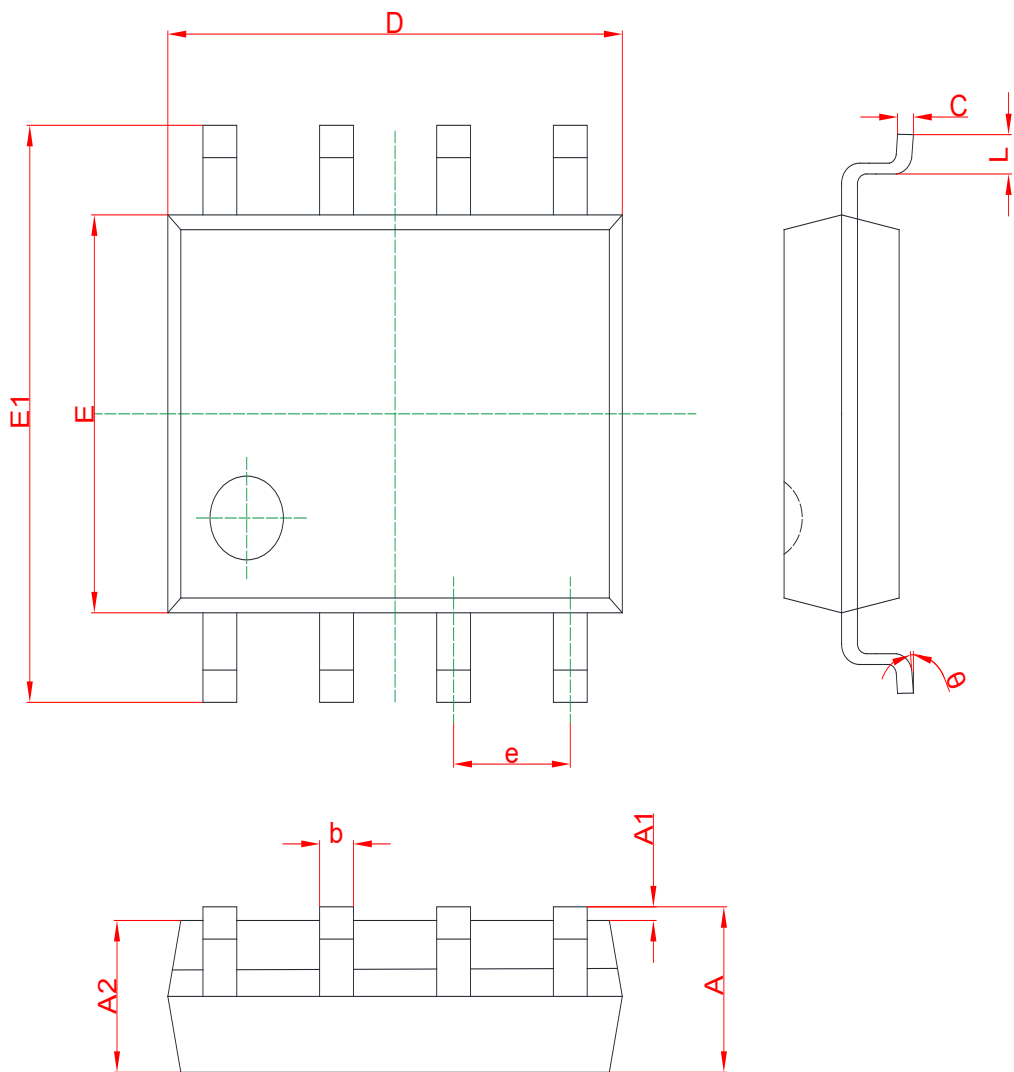
COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

Symbol	Dimensions			Symbol	Dimensions		
	Min.	NOM.	Max.		Min.	NOM.	Max.
A	1.55	1.65	1.75	L	0.50	0.60	0.70
A1	0.06	0.11	0.16	L1	0.90	1.05	1.20
A2	1.35	1.45	1.55	θ	0°	4°	8°
A3	0.60	0.70	0.80	B1	0.14MAX		
b	0.30	0.40	0.50	B2	0.12MAX		
c	0.17	0.20	0.25	b1	0.66MAX		
D	4.80	4.90	5.00	b2	0	0.04	0.08
E	5.80	6.00	6.20	e	1.27BSC		
E1	3.80	3.90	4.00				

ESQQ13P04

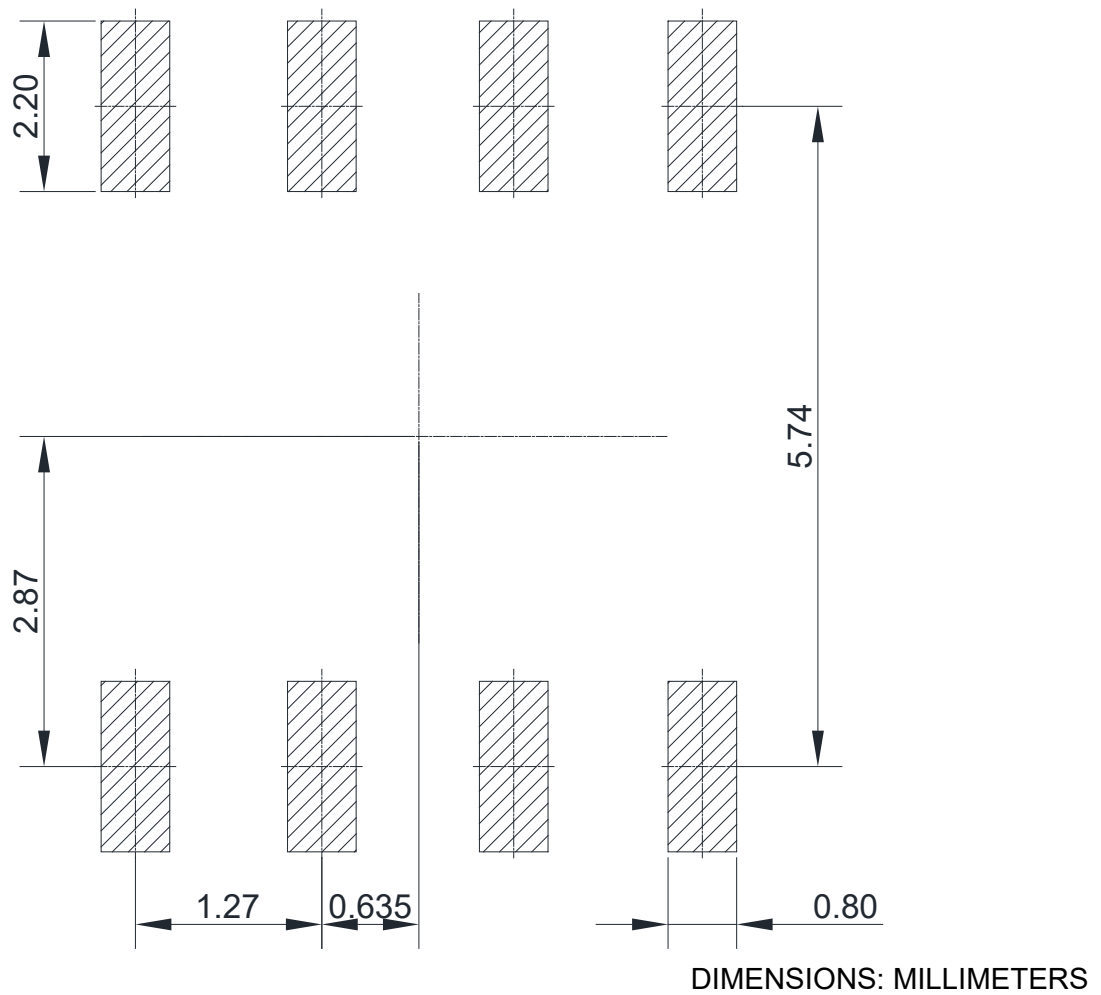
Rev-1.2

POD C(X)



Symbol	Dimensions		Symbol	Dimensions	
	Min.	Max.		Min.	Max.
L	0.40	0.60	e	1.27 TYP	
D	4.95	5.05	c	0.15	0.25
E	3.8	4.0	A2	1.33	1.50
E1	5.80	6.20	A1	0.04	0.20
b	0.4 TYP		θ	0°	8°

8. Recommended Soldering Footprint



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