

SuperMOS – SOP8 -30V BV_{DSS}, 9.5mΩ R_{DS(ON)}, P-channel MOSFET

1. Description

The ESPM3021-8/TR 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 ESPM3021-8/TR is Pb-free.

2. Features

- -30V, R_{DS(ON)}=9.5mΩ(Typ.) @V_{GS}=-10V
R_{DS(ON)}=14mΩ(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 Sizes
ESPM3021-8/TR	SOP8	ES4407/lot	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	13 inches

Table-1 Ordering information

5. Pin Configuration and Functions

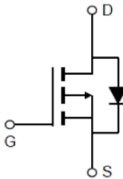
Pin	Function	Outline	Circuit Diagram
4	Gate	Note d 	
1/2/3	Source		
5/6/7/8	Drain		

Table-2 Pin configuration

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}	± 20	V
Continuous Drain Current ^a	$T_A=25^{\circ}\text{C}$	I_D	-12	A
	$T_A=100^{\circ}\text{C}$		-10	
Maximum Power Dissipation ^a	$T_A=25^{\circ}\text{C}$	P_D	3.1	W
	$T_A=100^{\circ}\text{C}$		2.0	
Pulsed Drain Current ^b		I_{DM}	-60	A
Avalanche Current, Single Pulsed ^c		I_{AS}	-22	A
Avalanche Energy, Single Pulsed ^c		E_{AS}	72	mJ
Operating Junction Temperature		T_J	150	$^{\circ}\text{C}$
Storage Temperature Range		T_{stg}	-55 to +150	$^{\circ}\text{C}$

Thermal resistance ratings

Single Operation					
Parameter		Symbol	Typical	Maximum	Unit
Junction-to-Ambient Thermal Resistance ^a	$t \leq 10\text{ s}$	$R_{\theta JA}$	32	40	$^{\circ}\text{C/W}$
Junction-to-Case Thermal Resistance	Steady State	$R_{\theta JC}$	17	24	

Note:

a: Surface mounted on FR4 Board using 1 square inch pad size, 1oz copper

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

c: EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-30\text{V}$, $V_G=-10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

d: 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} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1	-1.5	-2	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-12A		9.5	13	mΩ
		V _{GS} =-4.5V, I _D =-7A		14	17	
Forward Trans conductance	g _{FS}	V _{DS} =-5.0V, I _D =-10A			40	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		6.0		Ω
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-15A		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		-0.7	-1	V

7. Typical Characteristic

Figure 1. On-Regin Characteristics

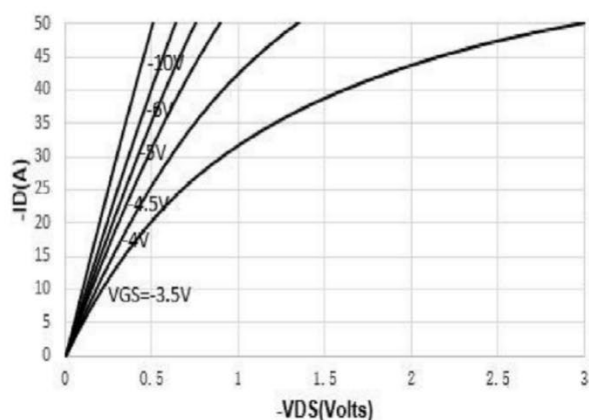


Figure 2. Transfer Characteristics

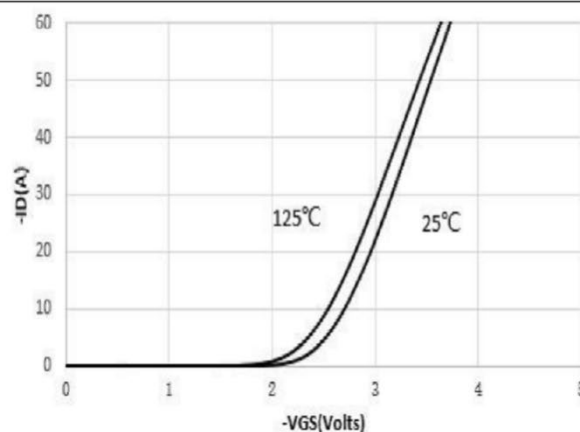


Figure 3. On-Resistance vs. Drain Current and Gate Voltage

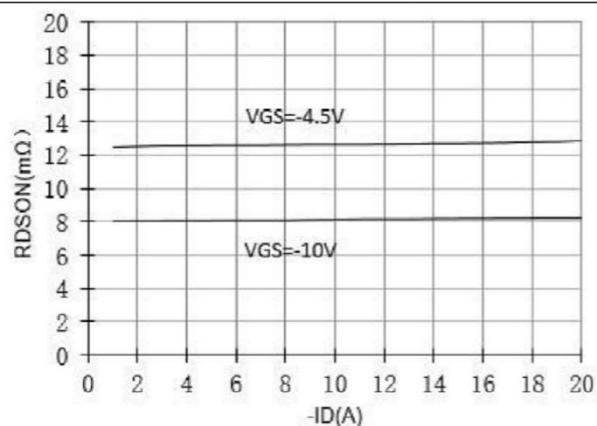


Figure 4. On-Resistance vs. Junction Temperature

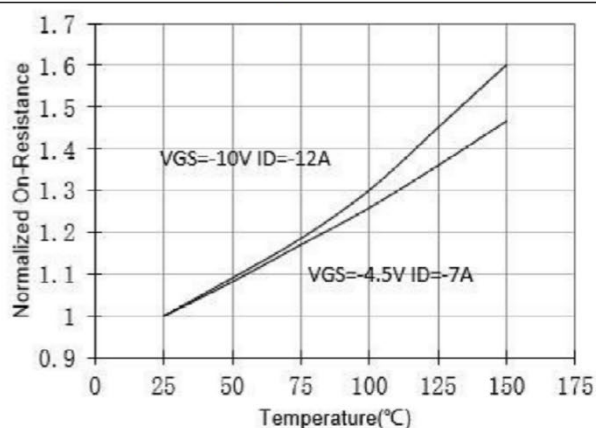


Figure 5. On-Resistance vs. Gate-Source Voltage

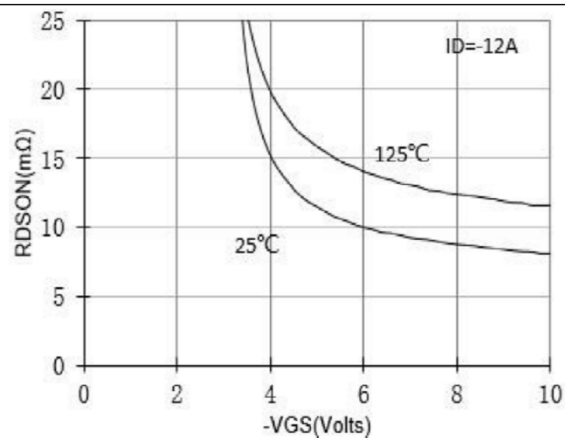


Figure 6. Body-Diode Characteristics

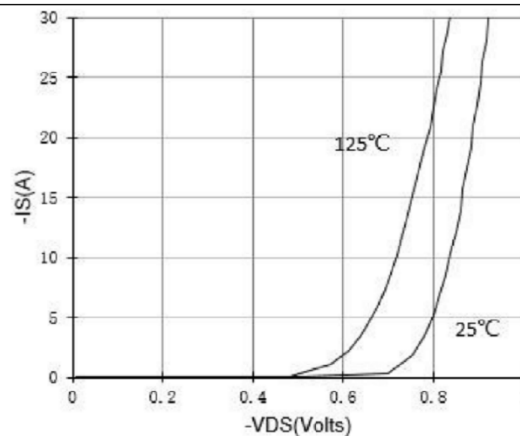
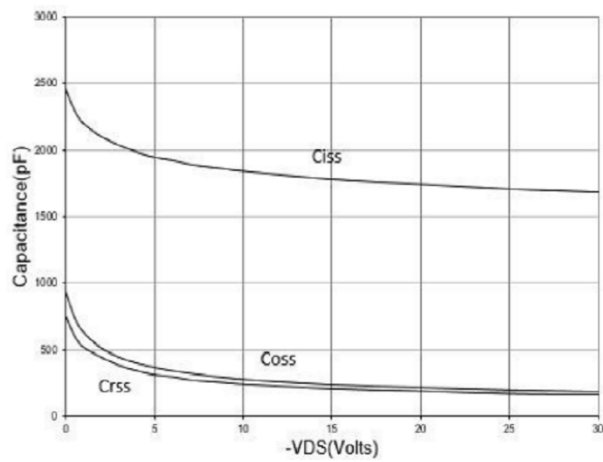
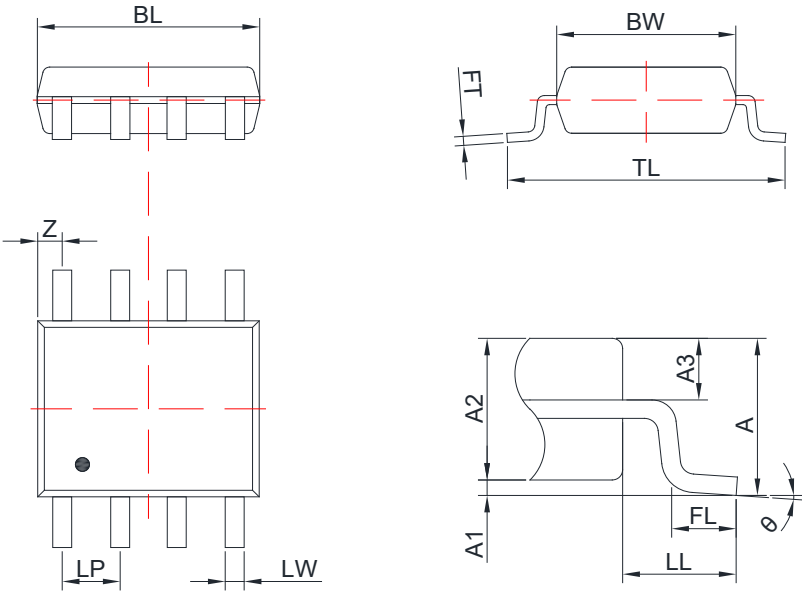


Figure 7. Capacitance Characteristics

8. Dimension (SOP8)

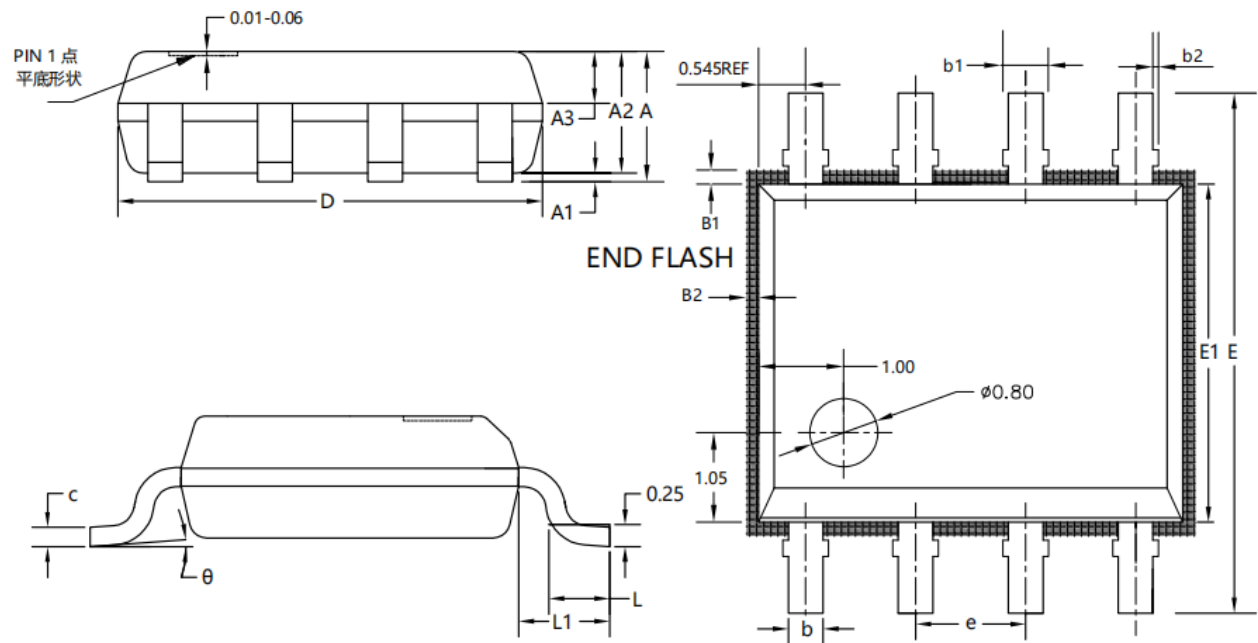
POD A(Y)



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°

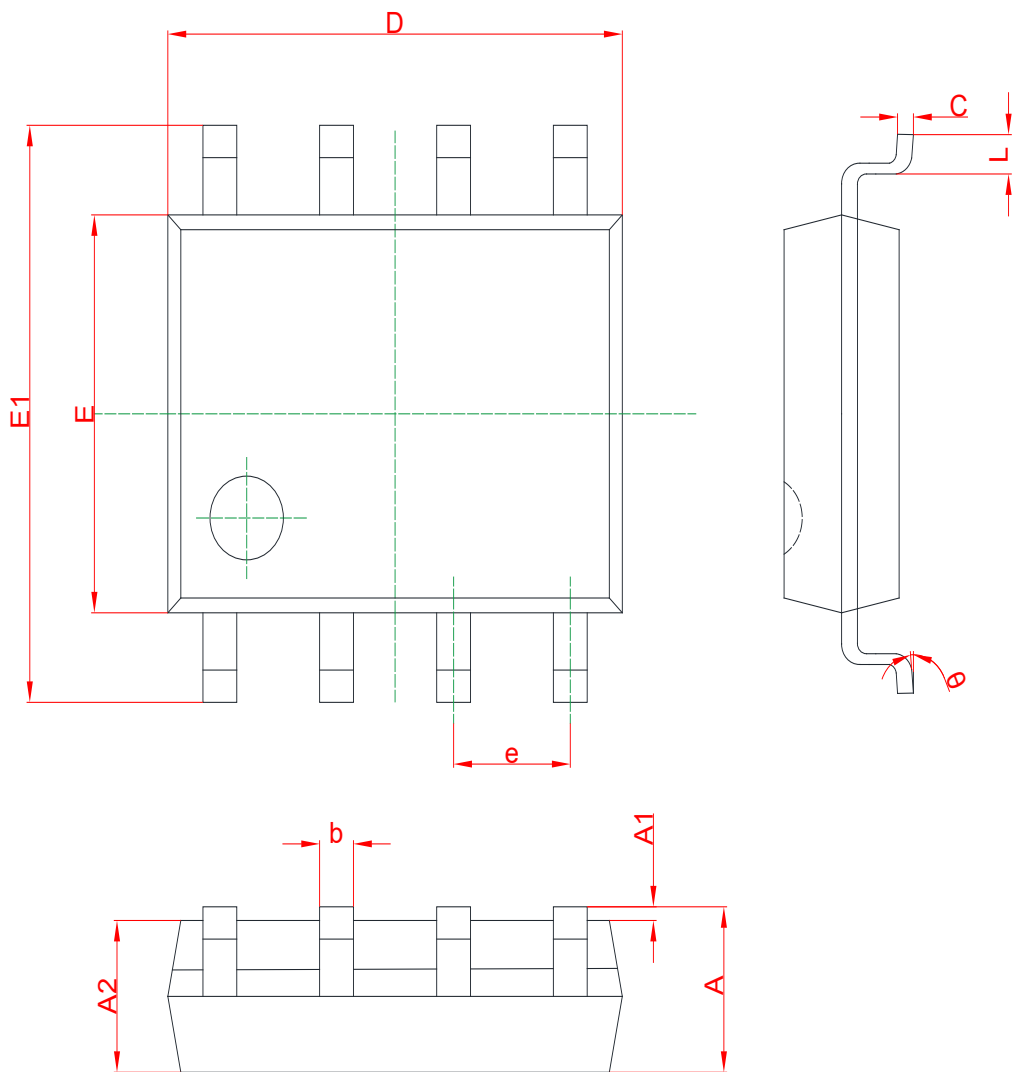
POD B(C)



COMMON DIMENSIONS: UNITS OF MEASURE=MILLIMETER

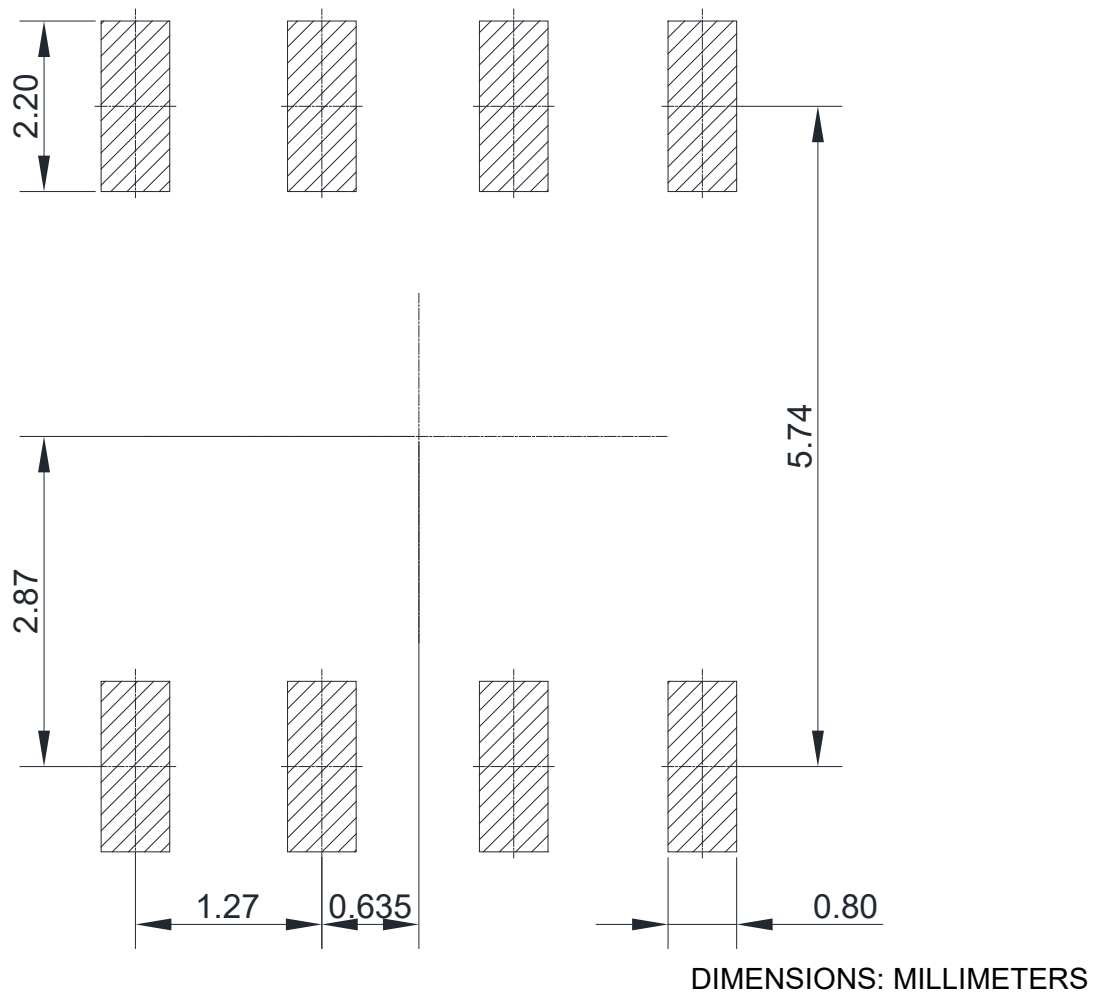
Symbol	Dimensions			Symbol	Dimensions		
	Min.	NOM.	Max.		Min.	NOM.	Max.
A	1.55	1.65	1.75	L	0.50	0.60	0.70
A1	0.06	0.11	0.16	L1	0.90	1.05	1.20
A2	1.35	1.45	1.55	θ	0°	4°	8°
A3	0.60	0.70	0.80	B1	0.14MAX		
b	0.30	0.40	0.50	B2	0.12MAX		
c	0.17	0.20	0.25	b1	0.66MAX		
D	4.80	4.90	5.00	b2	0	0.04	0.08
E	5.80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

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°

9. Recommended Soldering Footprint



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