

SuperMOS – SOT-23 -12V BV_{DSS} , 29m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The IRLML6401TRPBF-ES 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 IRLML6401TRPBF-ES is Pb-free.

2. Features

- -12V, $R_{DS(on)}=29m\Omega(TYP.) @V_{GS}=-4.5V$
 $R_{DS(on)}=45m\Omega(TYP.) @V_{GS}=-2.5V$
 $R_{DS(on)}=67m\Omega(TYP.) @V_{GS}=-1.8V$
- 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

4. Ordering Information

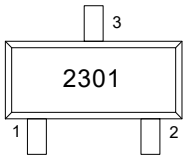
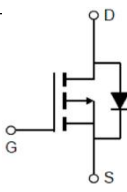
Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
IRLML6401TRPBF-ES	SOT-23	2301	Halogen free	Tape & Reel	3,000 PCS	UL 94V-0	7 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
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IRLML6401TRPBF-ES

Rev-1.3

1	Gate		
2	Source		
3	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}	-12	V
Gate-Source Voltage		V_{GS}	± 12	V
Continuous Drain Current	$T_A = 25^\circ\text{C}$	I_D	-3.8	A
	$T_A = 100^\circ\text{C}$		-2.3	
Maximum Power Dissipation	$T_A = 25^\circ\text{C}$	P_D	1.2	W
Pulsed Drain Current		I_{DM}	-15	A
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 ($t \leq 10\text{s}$)	$R_{\theta JA}$		104	$^\circ\text{C/W}$

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	-12			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-12V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±12V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-0.4	-0.62	-1.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-4.5V, I _D =-3.8A		29	40	mΩ
		V _{GS} =-2.5V, I _D =-3A		45	60	
		V _{GS} =-1.8V, I _D =-2.5A		67	85	
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-6V f=1MHz		500		pF
Output Capacitance	C _{OSS}			118		
Reverse Transfer Capacitance	C _{RSS}			101		
Total Gate Charge	Q _G	V _{GS} =-4.5V, V _{DS} =-6V I _D =-3.8A		8.5		nC
Gate-to-Source Charge	Q _{GS}			1.5		
Gate-to-Drain Charge	Q _{GD}			2.6		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-4.5V, V _{DS} =-6V ID=-3.8A, R _G =3Ω		6		ns
Rise Time	t _r			35		
Turn-Off Delay Time	t _{d(OFF)}			50		
Fall Time	t _f			52		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-3.8A			-1.5	V

7. Typical Characteristics

Figure 1: Output Characteristics

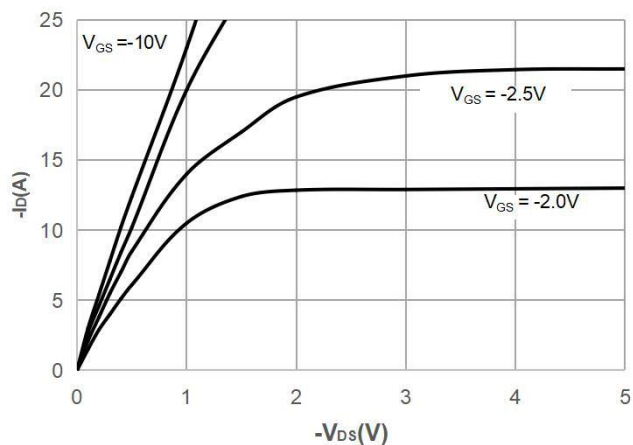


Figure 2: Typical Transfer Characteristics

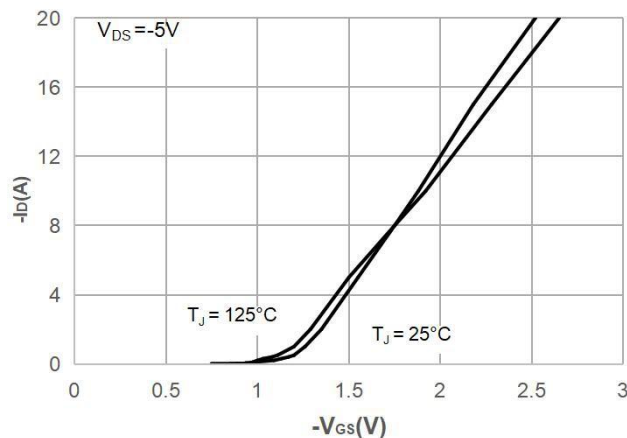


Figure 3: On-resistance vs. Drain Current

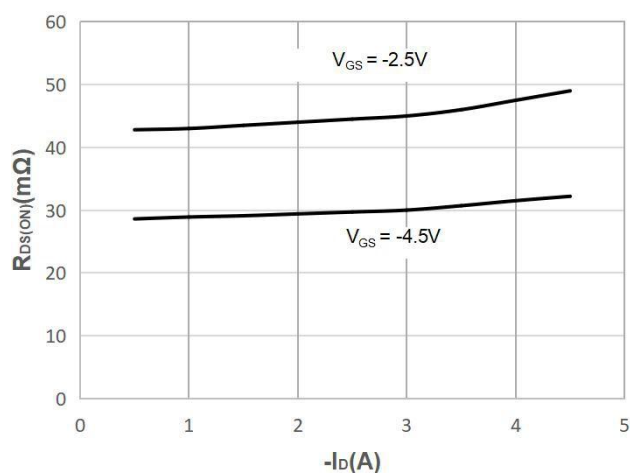


Figure 4: Body Diode Characteristics

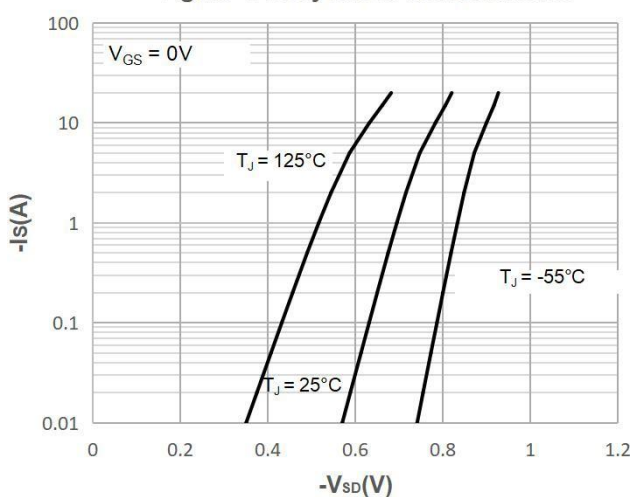


Figure 5: Capacitance Characteristics

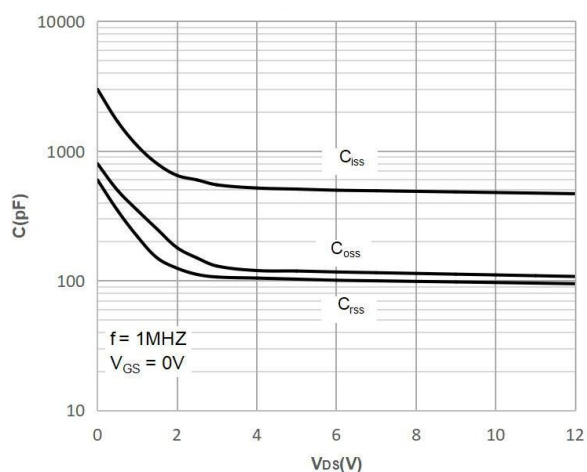
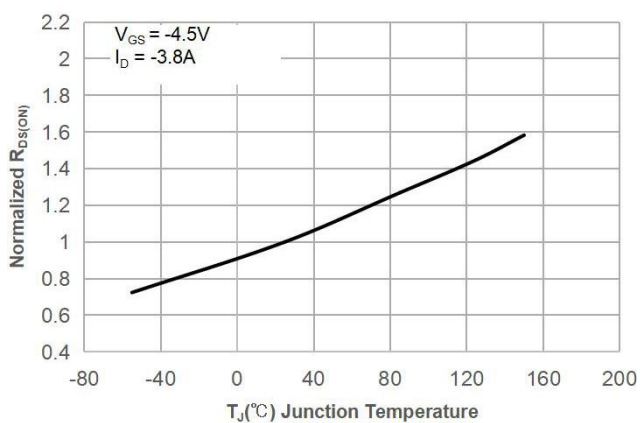
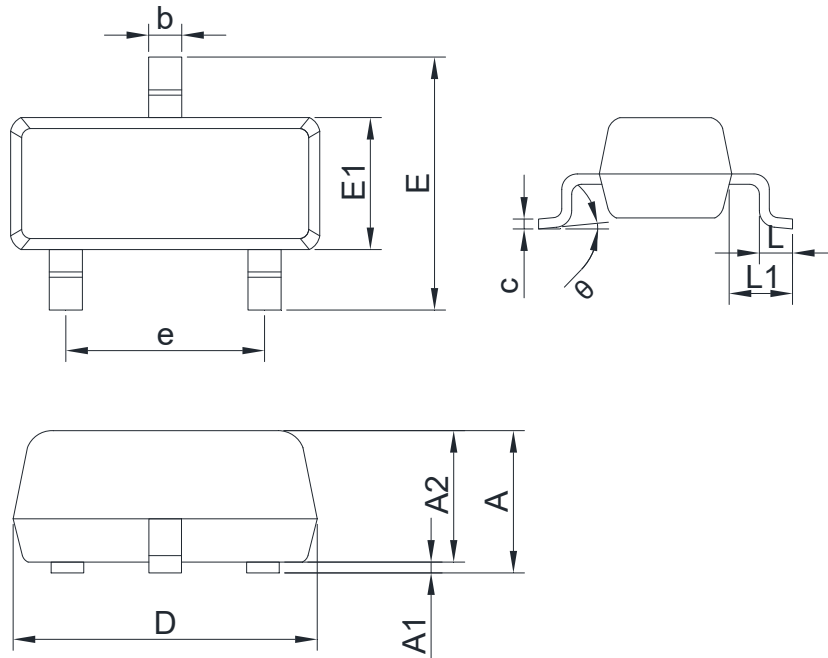


Figure 6: Normalized on Resistance vs Junction Temperature



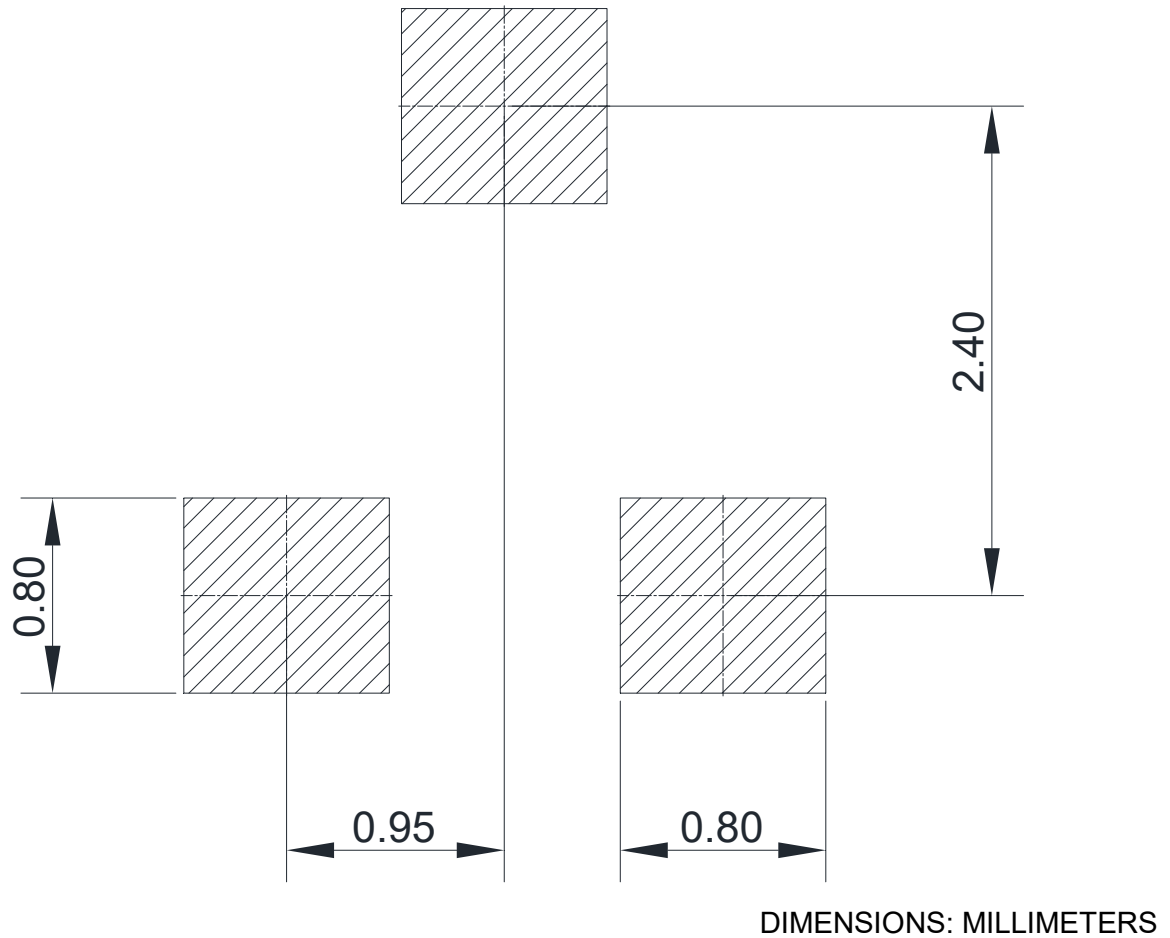
8. Dimension (SOT-23)

POD(Z)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER					
SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	0.90	1.20	E	2.25	2.55
A1	0.00	0.10	E1	1.20	1.40
A2	0.90	1.10	e	1.80	2.00
b	0.30	0.50	L	0.30	0.50
c	0.07	0.18	L1	0.475	0.625
D	2.80	3.04	θ	0°	8°

9. Recommended Soldering Footprint



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