

IRF5305PBF(ES)

Rev-1.1

SuperMOS – TO-220F -60V BV_{DSS} , 27m Ω $R_{DS(on)}$, P-channel MOSFET

1. Description

The IRF5305PBF(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 IRF5305PBF(ES) is Pb-free.

2. Features

- 60V, $R_{DS(on)}$ =27m Ω (TYP.) @ V_{GS} =-10V
- $R_{DS(on)}$ =31m Ω (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 Tube	Flammability Rating
IRF5305PBF(ES)	TO-220F	ESTF409/lot	Halogen free	Tube	50 PCS	UL 94V-0

Table-1 Ordering information

5. Pin Configuration and Functions

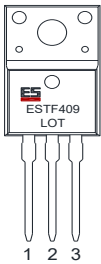
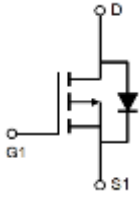
Pin	Function	Outline	Circuit Diagram
3	Source		
1	Gate		
2	Drain		

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}	-60	V
Gate-Source Voltage		V_{GS}	± 20	V
Continuous Drain Current ^D	$T_A=25^{\circ}\text{C}$	I_D	-24	A
	$T_A=100^{\circ}\text{C}$		-17	
Continuous Drain Current	$T_A=25^{\circ}\text{C}$	I_{DSM}	-5.4	A
	$T_A=70^{\circ}\text{C}$		-4.3	
Maximum Power Dissipation ^B	$T_A=25^{\circ}\text{C}$	P_D	43	W
	$T_A=100^{\circ}\text{C}$		21	
Maximum Power Dissipation ^A	$T_A=25^{\circ}\text{C}$	P_{DSM}	2.16	W
	$T_A=70^{\circ}\text{C}$		1.38	
Pulsed Drain Current ^C		I_{DM}	-60	A
Avalanche Current, Single Pulsed ^E		I_{AS}	-26.5	A
Avalanche Energy, Single Pulsed ^E		E_{AS}	105	mJ
Operating Junction Temperature		T_J	-55 to +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($t \leq 10\text{s}$)	$R_{\theta JA}$	10	12	$^{\circ}\text{C/W}$
Junction-to-Ambient Thermal Resistance (Steady-State)		48.5	58	$^{\circ}\text{C/W}$
Junction-to-Case Thermal Resistance (Steady-State)	$R_{\theta JC}$	2.9	3.5	$^{\circ}\text{C/W}$

Notes:

A: The value of $R_{\theta JA}$ is measured with the device mounted on 1in2 FR-4 board with 2oz. Copper, in a still air environment with $T_A=25^{\circ}\text{C}$. The Power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C . The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

B: The power dissipation P_D is based on $T_J(\text{MAX})=175^{\circ}\text{C}$, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

C: Repetitive rating, pulse width limited by junction temperature $T_J(\text{MAX})=175^{\circ}\text{C}$. Ratings are based on low frequency and duty cycles to keep initial $T_J=25^{\circ}\text{C}$.

D: The maximum current rating is limited by bond-wires.

E. EAS condition: $T_J=25^{\circ}\text{C}$, $V_{DD}=-60\text{V}$, $V_G=-10\text{V}$, $L=0.3\text{mH}$, $R_g=25\Omega$

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Electrical Characteristics

At TA = 25°C unless otherwise specified

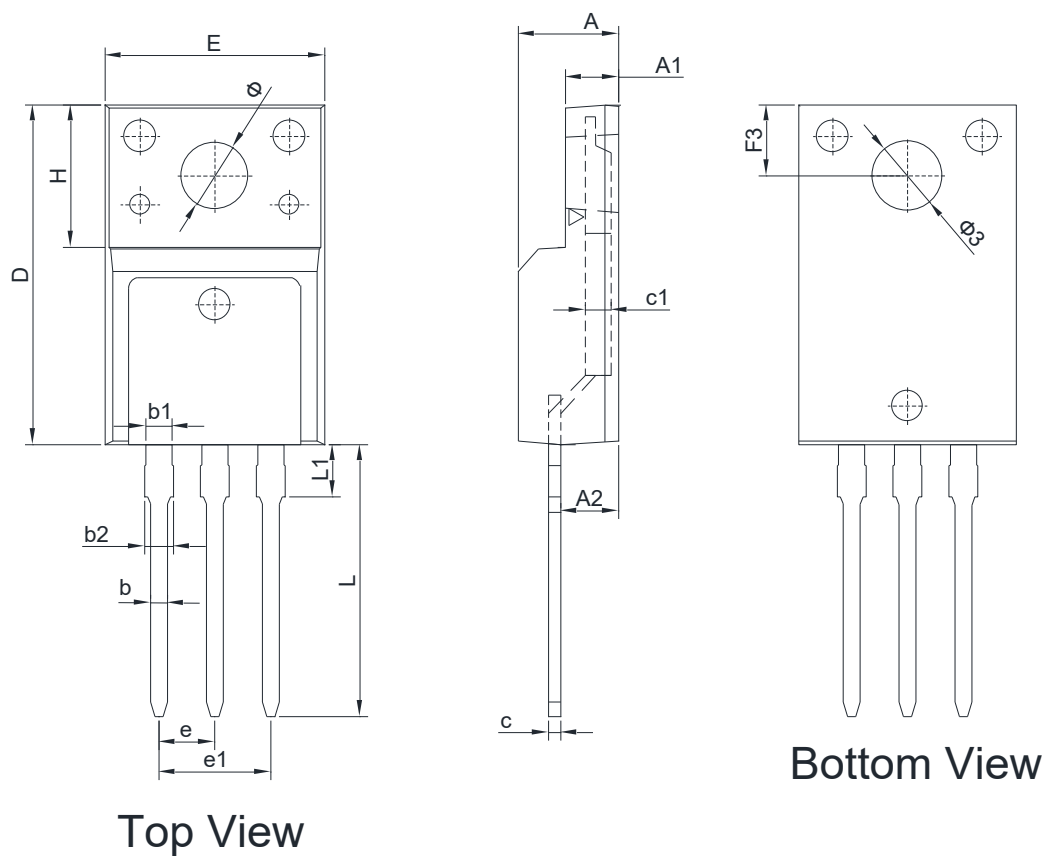
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-60			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-60V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.1	-1.6	-2.1	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		27	34	mΩ
		V _{GS} =-4.5V, I _D =-20A		31	38	
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-20A			60	S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, V _{DS} =-20V f=1MHz		3941		pF
Output Capacitance	C _{OSS}			191		
Reverse Transfer Capacitance	C _{RSS}			159		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-20V I _D =-20A		46.6		nC
Gate-to-Source Charge	Q _{GS}			9.1		
Gate-to-Drain Charge	Q _{GD}			6.2		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-15V, I _D =-1A, R _G =3Ω		45		ns
Rise Time	t _r			28		
Turn-Off Delay Time	t _{d(OFF)}			80		
Fall Time	t _f			6.6		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-1.0A			-1.2	V

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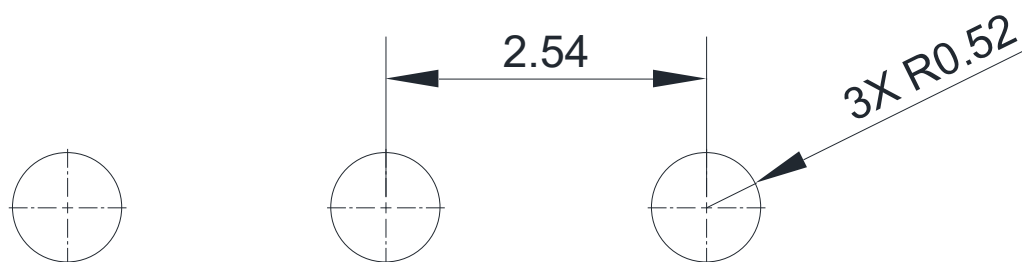
7. Dimension (TO-220F)

POD(X)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	4.50	4.70	4.90	H	6.70 REF		
A1	2.34	2.54	2.74	E	9.96	10.16	10.36
A2	2.56	2.76	2.96	e	2.54 BSC		
b	0.70	0.80	0.95	e1	5.08 BSC		
b1	1.18	1.28	1.43	L	12.68	12.98	13.28
b2	1.25	1.35	1.55	L1	2.78	2.93	3.08
c	0.40	0.50	0.65	F3	3.15	3.30	3.45
c1	1.20	1.30	1.35	Φ	3.03	3.18	3.45
D	15.57	15.87	16.17	Φ_3	3.15	3.45	3.65

8. Recommendation of Hole Pattern



DIMENSIONS: MILLIMETERS

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