HIRF730 / HIRF730F

N-CHANNEL POWER MOSFET

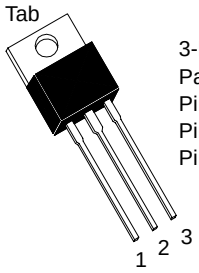
Description

Third Generation HEXFETs from international Rectifier provide the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost-effectiveness.

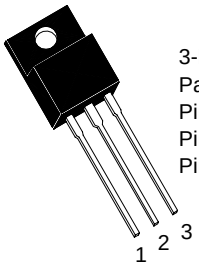
Features

- Dynamic dv/dt Rating
- Repetitive Avalanche Rated
- Fast Switching
- Ease of Paralleling
- Simple Drive Requirements

HIRF730 Series Pin Assignment

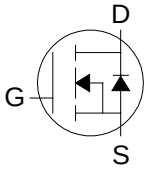


3-Lead Plastic **TO-220AB**
Package Code: E
Pin 1: Gate
Pin 2 & Tab: Drain
Pin 3: Source



3-Lead Plastic **TO-220FP**
Package Code: F
Pin 1: Gate
Pin 2: Drain
Pin 3: Source

HIRF730 Series Symbol



Thermal Characteristics

Symbol	Parameter	Value		Units
$R\theta_{JC}$	Thermal Resistance Junction to Case Max.	TO-220AB	1.71	°C/W
		TO-220FP	3.3	
$R\theta_{JA}$	Thermal Resistance Junction to Ambient Max.	62		°C/W

Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	400	V
I_D	Drain to Current (Continuous)	5.5	A
I_{DM}	Drain to Current (Pulsed) (*1)	22	A
V_{GS}	Gate-to-Source Voltage (Continue)	±20	V
P_D	Total Power Dissipation TO-220AB TO-220FP	 74 38	W
	Derate above 25°C TO-220AB TO-220FP	 0.58 0.3	W/°C
E_{AS}	Single Pulse Avalanche Energy (*2)	290	mJ
I_{AR}	Avalanche Current (*1)	5.5	A
E_{AR}	Repetitive Avalanche Energy (*1)	7.4	mJ
d_v/d_t	Peak Diode Recovery (*3)	4	V/ns
T_j	Operating Temperature Range	-55 to 150	°C
T_{stg}	Storage Temperature Range	-55 to 150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	300	°C

*1: Repetitive rating; pulse width limited by max. junction temperature
*2: V_{DD}=50V, starting T_j=25°C, L=16mH, R_G=25Ω, I_{AS}=5.5A
*3: I_{SD}≤5.5A, di/dt≤90A/us, V_{DD}≤$V_{(BR)DSS}$, T_J≤150°C

ELectrical Characteristics (T_j=25°C, unless otherwise specified)

Symbol	Characteristic		Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage (V_{GS}=0V, I_D=250uA)		400	-	-	V
I_{DSS}	Drain-Source Leakage Current (V_{DS}=400V, V_{GS}=0V)		-	-	1	uA
	Drain-Source Leakage Current (V_{DS}=320V, V_{GS}=0V, T_j=125°C)				50	uA
I_{GSSF}	Gate-Source Leakage Current-Forward (V_{gsf}=20V, V_{DS}=0V)		-	-	100	nA
I_{GSSR}	Gate-Source Leakage Current-Reverse (V_{gsr}=-20V, V_{DS}=0V)		-	-	-100	nA
$V_{GS(th)}$	Gate Threshold Voltage (V_{DS}=V_{GS}, I_D=250uA)		2	-	4	V
$R_{DS(on)}$	Static Drain-Source On-Resistance (V_{GS}=10V, I_D=3.3A)(*4)		-	-	1	Ω
g_{FS}	Forward Transconductance (V_{DS}=50V, I_D=3.3A)(*4)		2.9	-	-	S
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f=1MHz	-	700	-	pF
C_{oss}	Output Capacitance		-	170	-	
C_{rss}	Reverse Transfer Capacitance		-	64	-	
$t_{d(on)}$	Turn-on Delay Time	(V_{DD}=200V, I_D=3.5A, R_G=12Ω, R_D=57Ω)(*4)	-	10	-	ns
t_r	Rise Time		-	15	-	
$t_{d(off)}$	Turn-off Delay Time		-	38	-	
t_f	Fall Time		-	14	-	
Q_g	Total Gate Charge	(V_{DS}=320V, I_D=3.5A, V_{GS}=10V) (*4)	-	-	38	nC
Q_{gs}	Gate-Source Charge		-	-	5.7	
Q_{gd}	Gate-Drain Charge		-	-	22	
L_D	Internal Drain Inductance (Measured from the drain lead 0.25” from package to center of die)		-	4.5	-	nH
L_S	Internal Source Inductance (Measured from the drain lead 0.25” from package to source bond pad)		-	7.5	-	nH

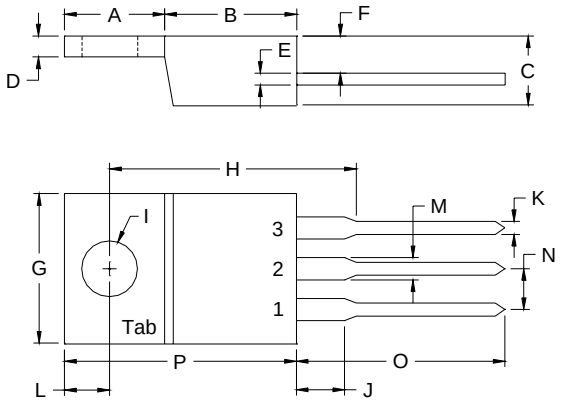
*4: Pulse Test: Pulse Width≤300us, Duty Cycle≤2%

Source-Drain Diode

Symbol	Characteristic		Min.	Typ.	Max.	Units
Q_{rr}	Reverse Recovery Charge	I_F=3.5A, d_i/d_t=100A/us, T_j=25°C (*4)	-	1.8	2.2	uC
t_{on}	Forward Turn-On Time		-	**	-	
t_{rr}	Reverse Recovery Time		-	270	530	ns
V_{SD}	Diode Forward Voltage	I_S=5.5A, V_{GS}=0V, T_j=25°C (*4)	-	-	1.6	V

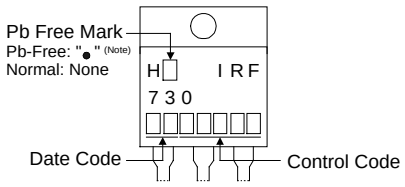
**: Negligible, Dominated by circuit inductance

TO-220AB Dimension



3-Lead TO-220AB
Plastic Package
HSMC Package Code: E

Marking:



Note: Green label is used for pb-free packing

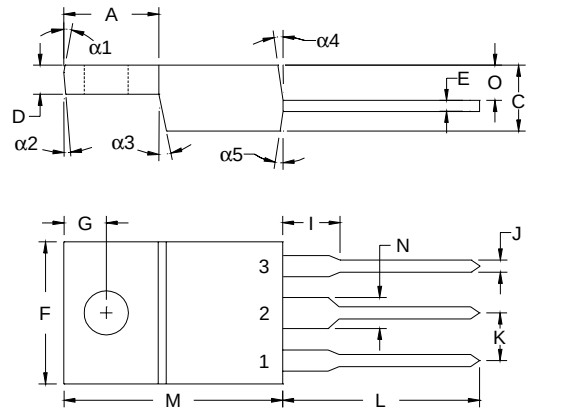
Pin Style: 1.Gate 2 & Tab.Drain 3.Source

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	5.58	7.49
B	8.38	8.90
C	4.40	4.70
D	1.15	1.39
E	0.35	0.60
F	2.03	2.92
G	9.66	10.28
H	-	*16.25
I	-	*3.83
J	3.00	4.00
K	0.75	0.95
L	2.54	3.42
M	1.14	1.40
N	-	*2.54
O	12.70	14.27
P	14.48	15.87

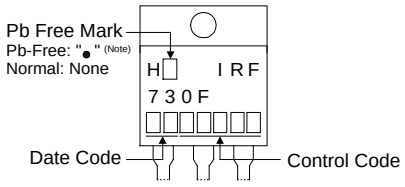
*: Typical, Unit: mm

TO-220FP Dimension



3-Lead TO-220FP
Plastic Package
HSMC Package Code: F

Marking:



Note: Green label is used for pb-free packing

Pin Style: 1.Gate 2.Drain 3.Source

Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	6.48	7.40
C	4.40	4.90
D	2.34	3.00
E	0.45	0.80
F	9.80	10.36
G	3.10	3.60
I	2.70	3.43
J	0.60	1.00
K	2.34	2.74
L	12.48	13.60
M	15.67	16.20
N	0.90	1.47
O	2.00	2.96
α1/2/4/5	-	*5°
α3	-	*27°

*: Typical, Unit: mm

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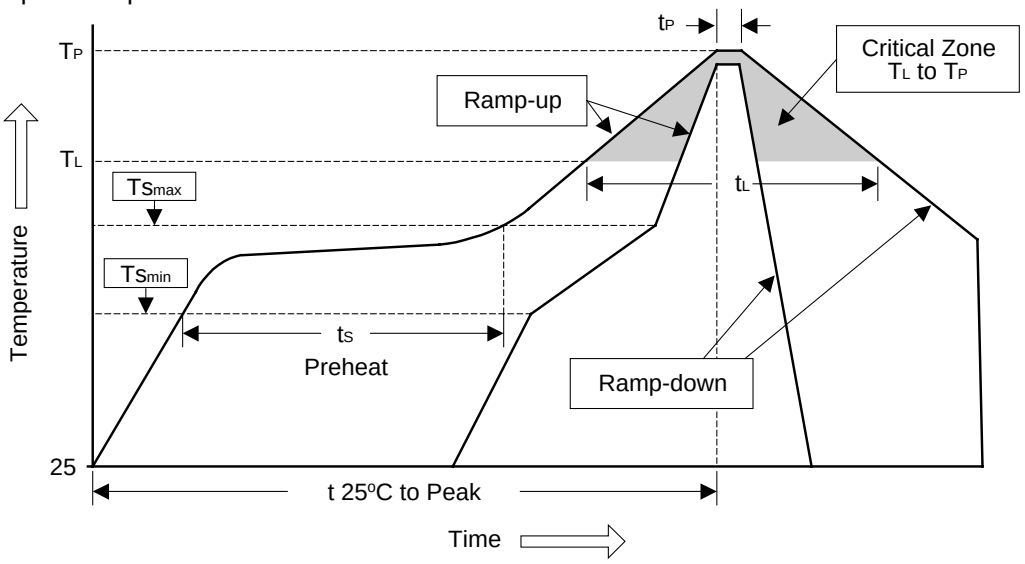
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Soldering Methods for HSMC's Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec