



HIRF740 / HIRF740F

N-Channel Power MOSFET (400V, 10A)

Description

This N-Channel MOSFETs 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

Thermal Characteristics

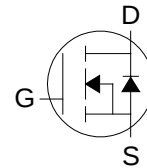
Symbol	Parameter	Value		Units
$R_{\theta_{JC}}$	Thermal Resistance Junction to Case Max.	TO-220AB	1.71	°C/W
		TO-220FP	3.3	
$R_{\theta_{JA}}$	Thermal Resistance Junction to Ambient Max.	62		°C/W

HIRF740 Series Pin Assignment

Tab
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

HIRF740 Series Symbol



Absolute Maximum Ratings

Symbol	Parameter	Value	Units
V_{DSS}	Drain-Source Voltage	400	V
I_D	Drain to Current (Continuous)($V_{GS}@10V$, $T_C=25^{\circ}C$)	10	A
	Drain to Current (Continuous)($V_{GS}@10V$, $T_C=100^{\circ}C$)	6.3	A
I_{DM}	Drain to Current (Pulsed) ^{*1}	40	A
V_{GS}	Gate-to-Source Voltage (Continue)	±20	V
P_D	Total Power Dissipation		
	TO-220AB	74	W
	TO-220FP	38	
	Derate above 25°C		
	TO-220AB	0.59	W/°C
	TO-220FP	0.3	
E_{AS}	Single Pulse Avalanche Energy ^{*2}	520	mJ
I_{AR}	Avalanche Current ^{*1}	10	A
E_{AR}	Repetitive Avalanche Energy ^{*1}	13	mJ
d_v/d_t	Peak Diode Recovery ^{*3}	4	V/ns
T_J, T_{stg}	Operating Junction and Storage Temperature Range	-55 to 150	°C
T_L	Maximum Lead Temperature for Soldering Purposes, 1.6mm from case for 10 seconds	300	°C

*1: Repetitive rating; pulse width limited by max. junction temperature

*2: $V_{DD}=50V$, starting $T_J=25^{\circ}C$, $L=9.1mH$, $R_G=25\Omega$, $I_{AS}=10A$

*3: $I_{SD}\leq 10A$, $di/dt\leq 120A/us$, $V_{DD}\leq V_{(BR)DSS}$, $T_J\leq 150^{\circ}C$



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
ΔV _{(BR)DSS} /ΔT _J	Breakdown Voltage Temp. Coefficient (Reference to 25°C, I _D =1mA)	-	0.49	-	V/°C
I _{DSS}	Drain-Source Leakage Current (V _{DS} =400V, V _{GS} =0V)	-	-	25	uA
	Drain-Source Leakage Current (V _{DS} =320V, V _{GS} =0V, T _J =125°C)			250	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 =6A) ^{*4}	-	-	0.55	Ω
g _{FS}	Forward Transconductance (V _{DS} =50V, I _D =6A) ^{*4}	5.8	-	-	S
C _{iss}	Input Capacitance	-	1400	-	pF
C _{oss}	Output Capacitance	-	330	-	
C _{rss}	Reverse Transfer Capacitance	-	120	-	
t _{d(on)}	Turn-on Delay Time	-	14	-	ns
t _r	Rise Time	-	27	-	
t _{d(off)}	Turn-off Delay Time	-	50	-	
t _f	Fall Time	-	24	-	
Q _g	Total Gate Charge	-	-	63	nC
Q _{gs}	Gate-Source Charge	-	-	9	
Q _{gd}	Gate-Drain Charge	-	-	32	
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%

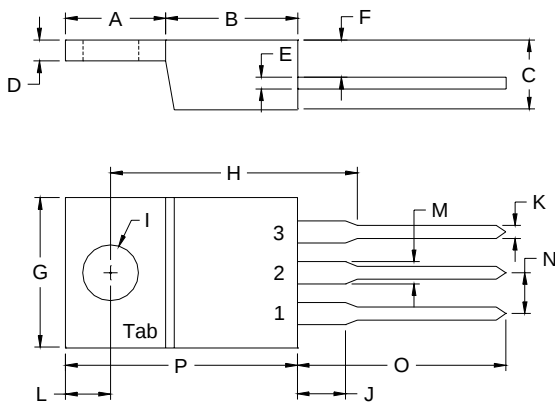
Source-Drain Diode

Symbol	Characteristic	Min.	Typ.	Max.	Units
I _S	Continuous Source Current (Body Diode)	-	-	10	A
I _{SM}	Pulsed Source Current (Body Diode) ^{*1}	-	-	40	A
t _{rr}	Reverse Recovery Time	-	370	790	ns
Q _{rr}	Reverse Recovery Charge	-	3.8	8.2	uC
V _{SD}	Diode Forward Voltage	-	-	2	V
t _{on}	Forward Turn-On Time	-	**	-	

** : Negligible, Dominated by circuit inductance



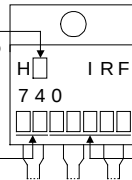
TO-220AB Dimension



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

Marking:

Pb Free Mark
Pb-Free: "●" (Note)
Normal: None



Date Code Control Code

Note: Green label is used for pb-free packing

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

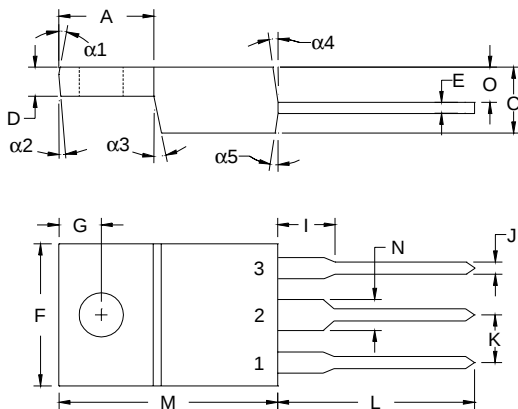
Material:

- 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

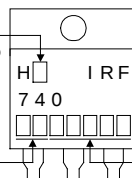
TO-220FP Dimension



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

Marking:

Pb Free Mark
Pb-Free: "●" (Note)
Normal: None



Date Code Control Code

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
$\alpha 1/2/4/5$	-	*5°
$\alpha 3$	-	*27°

*: Typical, Unit: mm

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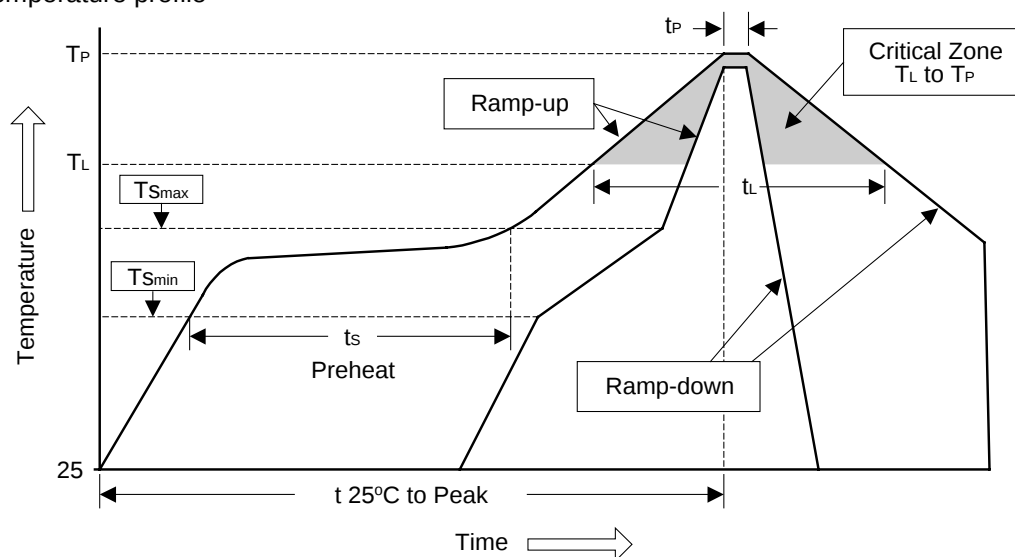


Soldering Methods for HSMC's Products

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 (T_{smin})	100°C	150°C
- Temperature Max (T_{smax})	150°C	200°C
- Time (min to max) (t_s)	60~120 sec	60~180 sec
T_{smax} to T_L		
- Ramp-up Rate	<3°C/sec	<3°C/sec
Time maintained above:		
- Temperature (T_L)	183°C	217°C
- Time (t_L)	60~150 sec	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