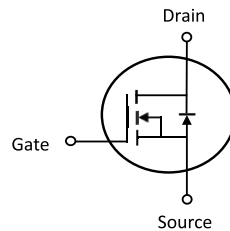


RoHS  
Compliant



## Device Schematic



## Applications

- Electronic Ballasts
- Electronic Transformer
- High Efficiency Switch Mode Power Supplies

## Features

- $R_{DS(ON)} = 2\Omega @ V_{GS} = 10V$
- High Input Resistance
- Low on Resistance

## Maximum Ratings @TA = +25°C

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	650	V
Gate-Source Voltage	$V_{GS}$	$\pm 30$	
Avalanche Current (Note 2.)	$I_{AR}$	4	A
Continuous Drain Current	$I_D$	4	
Pulsed Drain Current (Note 2.)	$I_{DM}$	16	
Single Pulsed Avalanche Energy (Note 3.)	$E_{AS}$	260	mJ
Repetitive Avalanche Energy (Note 2.)	$E_{AR}$	10.6	
Peak Diode Recovery dv/dt (Note 4.)	dv/dt	4.5	V/ns
Power Dissipation	$P_D$	36	W
Junction Temperature	$T_J$	150	°C
Operating Temperature Range	$T_{OPR}$	-55 to +150	
Storage Temperature Range	$T_{STG}$		

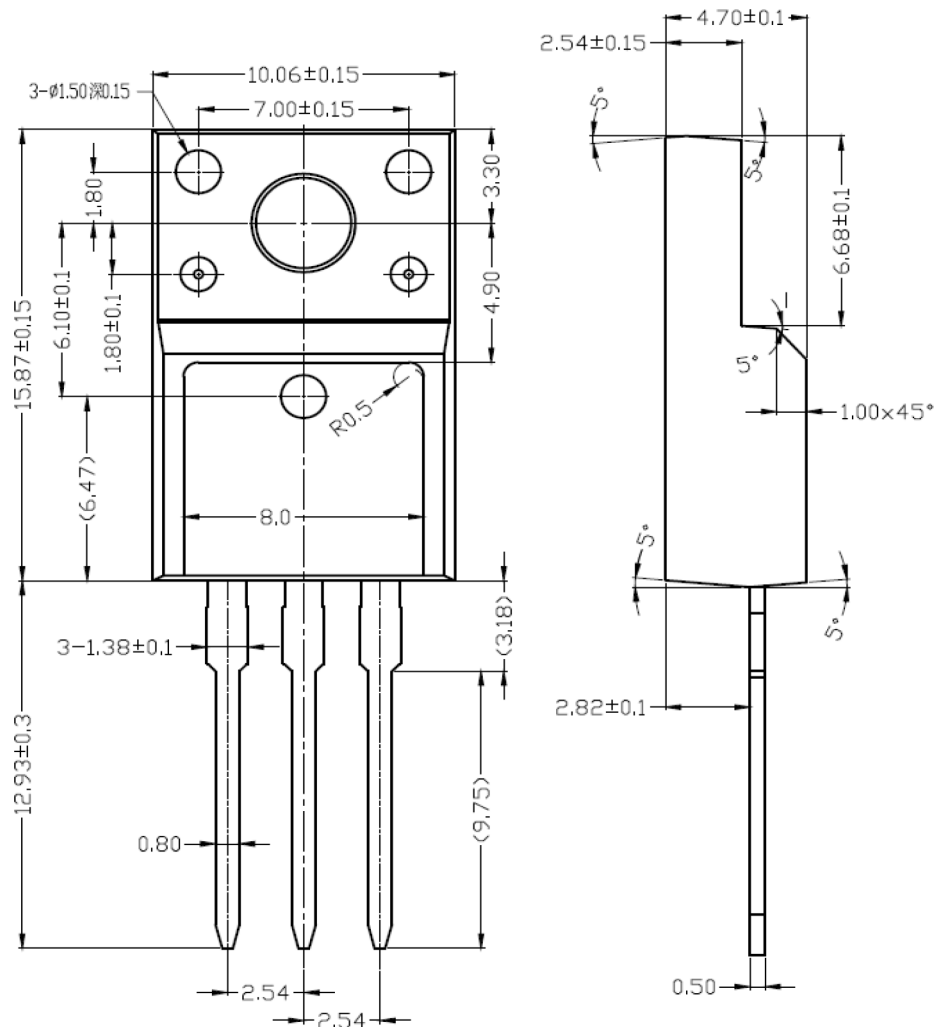
Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.  
 2. Absolute maximum ratings are stress ratings only and functional device operation is not implied.  
 3.  $L = 30mH$ ,  $I_{AS} = 4A$ ,  $V_{DD} = 50V$ ,  $R_G = 25\Omega$ , Starting  $T_J = 25^\circ C$   
 4.  $I_{SD} \leq 4.4A$ ,  $di/dt \leq 200A/\mu s$ ,  $V_{DD} \leq BVDSS$ , Starting  $T_J = 25^\circ C$

## Electrical Characteristics @TA = +25°C

Parameter	Test Conditions	Sym- bol	Min.	Typ.	Max.	Unit
Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	$V_{DSS}$	650	--	--	V
Forward Gate-Source Leakage Current	$V_{DS}=0V, V_{GS}=30V$	$I_{GSS}$	--		100	nA
Reverse Gate-Source Leakage Current	$V_{DS}=0V, V_{GS}=-30V$		--		-100	
Drain-Source Leakage Current	$V_{DS}=650V, V_{GS}=0V$	$I_{DSS}$	--		10	$\mu A$
<b>ON Characteristics</b>						
Gate-Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	$V_{th(GS)}$	2	--	4	V
Static Drain-Source On-State Resistance	$V_{GS}=10V, I_D=2A$	$R_{DS(ON)}$	--	2	2.4	$\Omega$
<b>Dynamic Characteristics</b>						
Input Capacitance	$V_{DS}=25V, V_{GS}=0V, F=1MHz$	$C_{ISS}$	-	570	670	pF
Output Capacitance		$C_{OSS}$	-	70	90	
Reverse Transfer Capacitance		$C_{RSS}$	-	8	11	
<b>Switching Characteristics</b>						
Turn-On Delay Time	$V_{DD}=325V, V_{GS}=4V, R_G=25\Omega, (Note\ 1,2)$	$t_{D(ON)}$	-	13	35	ns
Turn-On Rise Time		$t_R$		45	100	
Turn-Off Delay Time		$t_{D(OFF)}$		25	60	
Turn-Off Fall Time		$t_F$		35	80	
<b>Switching Characteristics</b>						
Total Gate Charge	$V_{DS}=520V, V_{GS}=10V, I_D=4A, (Note\ 1,2)$	$Q_G$	--	15	20	nC
Gate-Source Charge		$Q_{GS}$		3.4	--	
Gate-Drain Charge		$Q_{GD}$		7.1	--	
<b>Drain-Source Diode Characteristics And Maximum Ratings</b>						
Drain-Source Diode Forward Volta	$I_S=4A, V_{GS}=0V$	$V_{SD}$	-	--	1.4	V
Continuous Drain-Source Diode Forward Current		$I_S$		--	4.4	A
Pulsed Drain-Source Diode Forward Current		$I_{SM}$		--	17.6	
Reverse Recovery Time	$V_{GS}=0V, I_S=4A, diF/dt=-100A/\mu s (Note\ 1)$	$t_{RR}$		250	--	ns
Reverse Recovery Charge		$Q_{RR}$	1.5	--	$\mu C$	
Notes:1. Pulse Test:Pulse Width $\leq 300\mu s$ ,Duty Cycle $\leq 2\%$ . 2. Essentially independent of operating temperature						

Dimensions : Millimetres

## Outline Dimensions



## Part Number Table

Description	Part Number
N Channel MOSFET, 650V, 4A, TO-220F	HMF04N65S

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