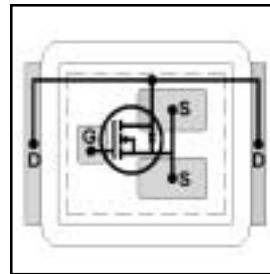


DirectFET™ Power MOSFET

- Application Specific MOSFETs
- Ideal for CPU Core DC-DC Converters
- Low Conduction Losses
- High Cdv/dt Immunity
- Low Profile (<0.7 mm)
- Dual Sided Cooling Compatible
- Compatible with existing Surface Mount Techniques

V_{DSS}	$R_{DS(on) \max}$	I_D
30V	3.9mΩ @ $V_{GS} = 10V$	28A
	5.5mΩ @ $V_{GS} = 4.5V$	22A



Description

The IRF6603 combines the latest HEXFET® Power MOSFET Silicon technology with the advanced DirectFET™ packaging to achieve the lowest on-state resistance in a package that has the footprint of an SO-8 and only 0.7 mm profile. The DirectFET package is compatible with existing layout geometries used in power applications, PCB assembly equipment and vapor phase, infra-red or convection soldering techniques. The DirectFET package allows dual sided cooling to maximize thermal transfer in power systems, IMPROVING previous best thermal resistance by 80%.

The IRF6603 balances both low resistance and low charge along with ultra low package inductance to reduce both conduction and switching losses. The reduced total losses make this product ideal for high efficiency DC-DC converters that power the latest generation of processors operating at higher frequencies. The IRF6603 has been optimized for parameters that are critical in synchronous buck converters including $R_{ds(on)}$, gate charge and Cdv/dt-induced turn on immunity. The IRF6603 offers particularly low $R_{ds(on)}$ and high Cdv/dt immunity for synchronous FET applications.

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain- Source Voltage	30	V
$I_D @ T_C = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	84	A
$I_D @ T_A = 25^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	28	
$I_D @ T_A = 70^\circ C$	Continuous Drain Current, $V_{GS} @ 10V$	22	
I_{DM}	Pulsed Drain Current ①	220	
$P_D @ T_A = 25^\circ C$	Power Dissipation	5.0	W
$P_D @ T_A = 70^\circ C$	Power Dissipation	3.2	
	Linear Derating Factor	40	mW/°C
V_{GS}	Gate-to-Source Voltage	+20/-12	V
T_J, T_{STG}	Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JA}$	Junction-to-Ambient③	—	25	°C/W
$R_{\theta JA}$	Junction-to-Ambient④	—	12.5	
$R_{\theta JA}$	Junction-to-Ambient⑤	—	25	
$R_{\theta JC}$	Junction-to-Case⑥	—	3.0	
$R_{\theta J-PCB}$	Junction-to-PCB mounted	—	1.0	

Static @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.02	—	V/°C	Reference to $25^\circ\text{C}, I_D = 1\text{mA}$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.8	3.9	m Ω	$V_{GS} = 10V, I_D = 28A$ ③
		—	3.9	5.5		$V_{GS} = 4.5V, I_D = 22A$ ③
$V_{GS(th)}$	Gate Threshold Voltage	1.0	2.5	3.2	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
I_{DSS}	Drain-to-Source Leakage Current	—	—	30	μA	$V_{DS} = 24V, V_{GS} = 0V$
		—	—	TBA		$V_{DS} = 24V, V_{GS} = 0V, T_J = 125^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -12V$

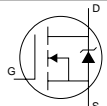
Dynamic @ $T_J = 25^\circ\text{C}$ (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
g_{fs}	Forward Transconductance	TBA	—	—	S	$V_{DS} = 16V, I_D = 28A$
Q_g	Total Gate Charge Cont FET	—	86	120	nC	$V_{GS} = 10V, V_{DS} = 16V, I_D = 28A$
Q_g	Total Gate Charge Sync FET	—	69	—		$V_{GS} = 10V, V_{DS} < 100\text{mV}$
Q_{gs1}	Pre-Vth Gate-Source Charge	—	12	—		$V_{DS} = 16V, I_D = 28A$
Q_{gs2}	Post-Vth Gate-Source Charge	—	2.5	—		
Q_{gd}	Gate to Drain Charge	—	19	28		
Q_{oss}	Output Charge	—	32	—		$V_{DS} = 16V, V_{GS} = 0V$
R_g	Gate Resistance	—	2.0	2.5		Ω
$t_{d(on)}$	Turn-On Delay Time	—	TBA	—	ns	$V_{DD} = 16V$
t_r	Rise Time	—	TBA	—		$I_D = 28A$
$t_{d(off)}$	Turn-Off Delay Time	—	TBA	—		$V_{GS} = 5.0V$ ③
t_f	Fall Time	—	TBA	—		Clamped Inductive Load
C_{iss}	Input Capacitance	—	TBA	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	TBA	—		$V_{DS} = 16V$
C_{rss}	Reverse Transfer Capacitance	—	TBA	—		$f = 1.0\text{MHz}$

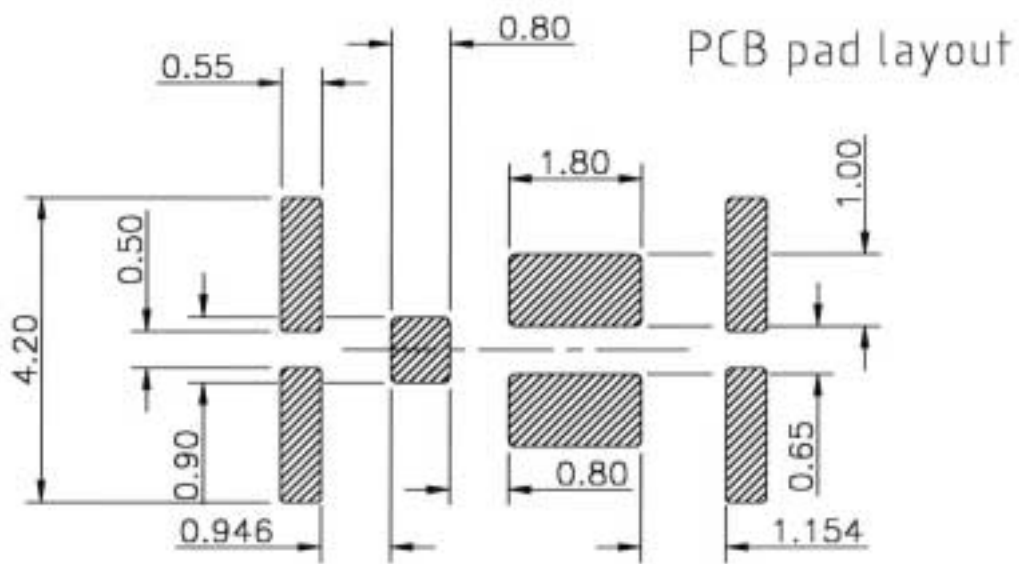
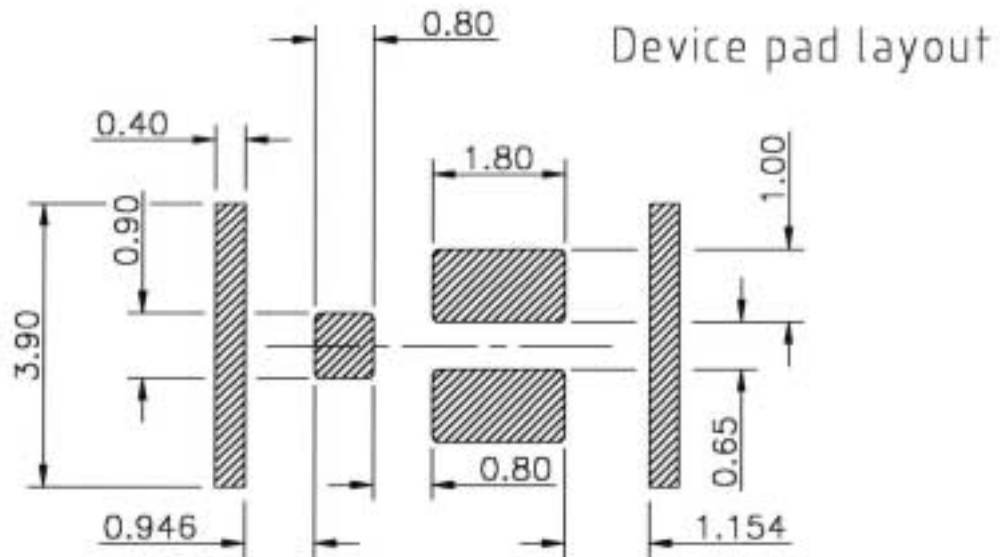
Avalanche Characteristics

Symbol	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy②	—	553	mJ
I_{AR}	Avalanche Current①	—	TBA	A

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	28	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	220		
V_{SD}	Diode Forward Voltage	—	1.0	TBA	V	$T_J = 25^\circ\text{C}, I_S = 28A, V_{GS} = 0V$ ③
		—	TBA	—		$T_J = 125^\circ\text{C}, I_S = 28A, V_{GS} = 0V$ ③
t_{rr}	Reverse Recovery Time	—	TBA	TBA	ns	$T_J = 25^\circ\text{C}, I_F = 28A, V_R = 16V$
Q_{rr}	Reverse Recovery Charge	—	145	174	nC	$di/dt = 700A/\mu s$ ③
$Q_{rr(s)}$	Reverse Recovery Charge (with Parallel Schottky)	—	TBA	TBA	nC	$di/dt = 100A/\mu s$ $V_{DS} = 16V, V_{GS} = 0V, I_S = 28A$

DirectFET™ Pad Layout

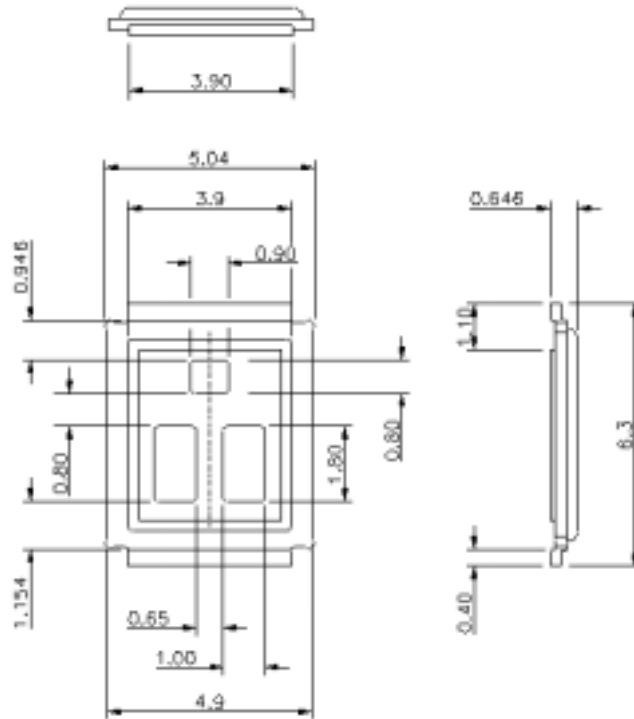


IRF6603

PROVISIONAL

International
IR Rectifier

DirectFET™ Outline Dimension



Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Pulse width $\leq 400\mu\text{s}$; duty cycle $\leq 2\%$.
- ③ Surface mounted on 1 in square Cu board
- ④ Used double sided cooling, mounting pad
- ⑤ Mounted on minimum footprint full size board with metalized back and with small clip heatsink
- ⑥ T_C measured with thermal couple mounted to top (Drain) of part.

Data and specifications subject to change without notice.
This product has been designed and qualified for the Consumer market.
Qualification Standards can be found on IR's Web site.

International
IR Rectifier

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