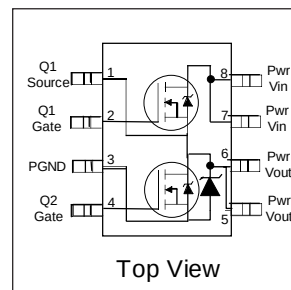
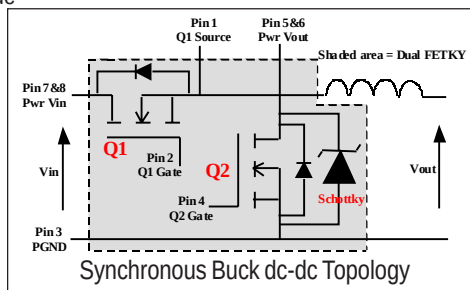


Dual FETKY™

Co-Packaged Dual MOSFET Plus Schottky Diode

- Co-Packaged Dual N-channel HEXFET® Power MOSFET and Schottky Diode
- Ideal for Synchronous Buck dc-dc converters up to 5A peak output
- Low Conduction Losses
- Low Switching Losses
- Low V_F Schottky Rectifier



Description

The FETKY™ family of co-packaged MOSFETs and Schottky diodes offers the designer an innovative, board space saving solution for switching regulator and power management applications. Advanced HEXFET® Power MOSFETs combined with low forward drop Schottkys result in extremely efficient devices suitable for a wide variety of portable electronics applications.

The SO-8 has been modified through a customized leadframe for enhanced thermal characteristics and multiple-die capability making it ideal in a variety of power applications. With these improvements, multiple devices can be used in an application with dramatically reduced board space. Internal connections enable easier board layout design with reduced stray inductance.

Absolute Maximum Ratings

Parameter		Symbol	Q1 - Control FET	Q2 - Synch FET & Schottky	Units
Drain-Source Voltage		V _{DS}	30		V
Gate-Source Voltage		V _{GS}	±20		
Continuous Output Current (V _{GS} ≥ 4.5V)⑤	T _L = 100°C	I _D	6.2		A
Pulsed Drain Current①		I _{DM}	48		
Power Dissipation	T _L = 100°C	P _D	2.0		W
Junction & Storage Temperature Range		T _J , T _{STG}	−55 to 150		°C
Schottky & Body Diode Average Forward Current④		I _F (AV)	TBD	TBD	A
Pulsed source Current		I _{SM}	TBD	TBD	

Thermal Resistance

Parameter	Symbol	Max.	Units
Maximum Junction-to-Ambient ^③	$R_{\theta JA}$	62.5	$^\circ C/W$
Maximum Junction-to-Lead ^⑥	$R_{\theta JL}$	25.0	

Electrical Characteristics		Q1 - Control FET			Q2 - Synch FET & Schottky			Units	Conditions
Parameter		Min	Typ	Max	Min	Typ	Max		
Drain-to-Source Breakdown Voltage*	BV_{DSS}	30	—	—	30	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
Static Drain-Source on Resistance*	$R_{DS(on)}$		28.5	33		22	28	m Ω	$V_{GS} = 4.5V, I_D = 5A$ ②
Gate Threshold Voltage*	$V_{GS(th)}$	1.0			1.0			V	$V_{DS} = V_{GS}, I_D = 250\mu A$
Drain-Source Leakage Current*	I_{DSS}			30			30	μA	$V_{DS} = 24V, V_{GS} = 0$
				0.15			4.3	mA	$V_{DS} = 24V, V_{GS} = 0, T_J = 125^\circ C$
Gate-Source Leakage Current*	I_{GSS}			± 100			± 100	nA	$V_{GS} = \pm 20V$
Total Gate Charge*	$Q_{G\ cont}$		7.6	9.9		15.9	20.7	nC	$V_{GS} = 5V, V_{DS} = 16V, I_D = 5A$
	$Q_{G\ synch}$		6.6	8.6		13.6	17.7		$V_{GS} = 5V, V_{DS} = 100mV, I_D = 5A$
Pre-Vth Gate-Source Charge	Q_{GS1}		2.0			5.5			$V_{DS} = 16V, I_D = 5A$
Post-Vth Gate-Source Charge	Q_{GS2}		0.5			0.9			
Gate to Drain Charge	Q_{GD}		1.8			4.8			
Switch Charge* ($Q_{GS2} + Q_{GD}$)	Q_{SW}		2.4	3.1		5.7	7.4		
Output Charge*	Q_{OSS}		13.3	17.3		9.1	12.0		$V_{DS} = 16V, V_{GS} = 0$
Gate Resistance	R_G		3.4			4.3		Ω	

Body Diode & Schottky Diode Ratings and Characteristics

Parameter		Min	Typ	Max	Min	Typ	Max	Units	Conditions
Diode Forward Voltage*	V _{SD}	-	-	-		0.48	0.52	V	I _S = 1A②, V _{GS} = 0V
Reverse Recovery Time	t _{rr}	-	-	-		TBD		ns	T _J = 25°C, I _S = 5.0A, V _{DS} = 16V
Reverse Recovery Charge	Q _{rr}	-	-	-		TBD		nC	
Forward Turn-On Time	t _{on}	n/a			Intrinsic turn-on time is negligible (turn-on is dominated by L _s + L _p)				

- ① Repetitive rating; pulse width limited by max. junction temperature.
 ② Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.
 ③ When mounted on 1 inch square copper board, $t < 10$ sec.
 ④ 50% Duty Cycle, Rectangular.
 ⑤ Combined Q1, Q2 I_{RMS} @ Pwr V_{out} pins. Switching or other losses will decrease RMS current capability
 ⑥ When mounted on IRNBPS2 design kit. Measured as device T_J to Pwr leads (V_{in} & V_{out})
 * Devices are 100% tested to these parameters.

Typical Application

The performance of the new Dual FETKY™ has been tested in-circuit using IR's new IRNBPS2 "Dual Output Synchronous Buck Design Kit". The Dual FETKY is suitable for synchronous buck DC-DC converters operating up to $21V_{in}$ and 5A peak output current. Typical output voltages include $1.8V_{out}$, $2.5V_{out}$, $3.3V_{out}$ & $5.0V_{out}$.

The Dual FETKY integrates all the power semiconductor devices for DC-DC conversion within one SO-8 package, see Figure 1. The high side control MOSFET (Q1) is optimized for low combined Q_{sw} and $R_{DS(on)}$. The low side synchronous MOSFET (Q2) is optimized for low $R_{DS(on)}$ and high C_{dv}/dt immunity. The ultra-low V_f schottky diode is internally connected in parallel with the synchronous MOSFET, for improved deadtime efficiency. For ease of circuit board layout, the Dual FETKY has been internally configured such that it represents a functional block for the power device portion of the synchronous buck DC-DC converter. This helps to minimize the external PCB traces compared to a discrete solution.

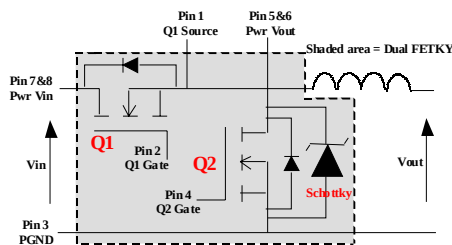


Figure 1. Synchronous Buck DC-DC converter using IR's new IRF7901D1 Dual FETKY™.

In-Circuit Efficiency

The in-circuit efficiency curves for the Dual FETKY are shown in Figure 2 & 3. The Dual FETKY can achieve up to 96.6% and 94.6% peak efficiency for the 5.0V and 3.3V applications respectively, with excellent maximum load efficiency.

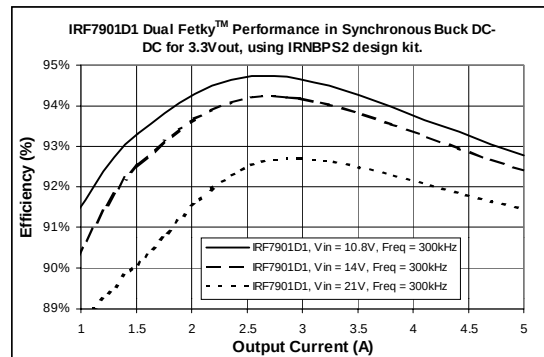


Figure 2. IRF7901D1 Dual FETKY™ electrical efficiency at 3.3Vout.

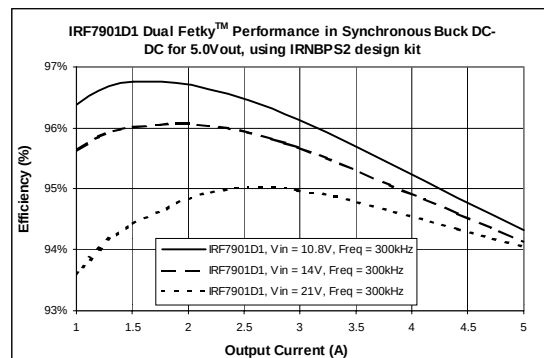
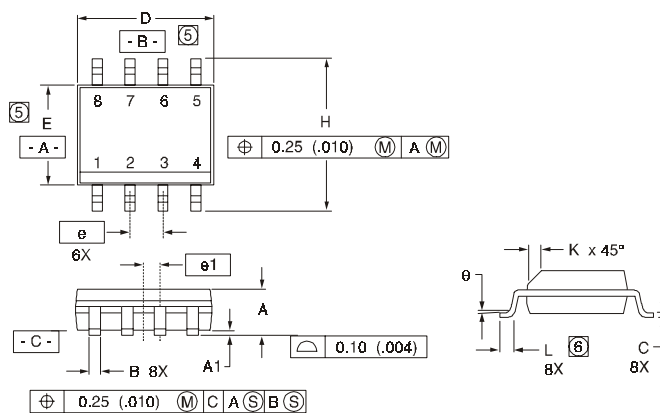


Figure 3. IRF7901D1 Dual FETKY™ electrical efficiency at 5.0Vout.

IRF7901D1

International
IOR Rectifier

SO-8 Package Outline

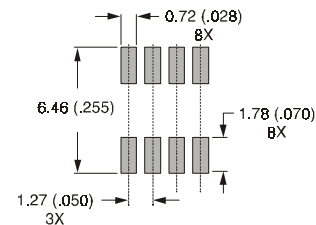


DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0532	.0688	1.35	1.75
A1	.0040	.0098	0.10	0.25
B	.014	.018	0.36	0.46
C	.0075	.0098	0.19	0.25
D	.189	.196	4.80	4.98
E	.150	.157	3.81	3.99
e	.050 BASIC		1.27 BASIC	
e1	.025 BASIC		0.635 BASIC	
H	.2284	.2440	5.80	6.20
K	.011	.019	0.28	0.48
L	.16	.050	0.41	1.27
θ	0°	8°	0°	8°

NOTES:

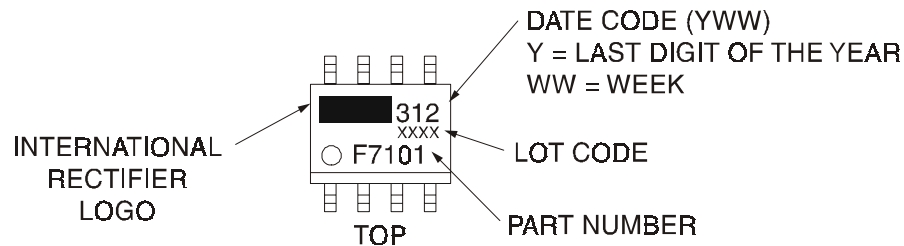
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M-1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSIONS ARE SHOWN IN MILLIMETERS (INCHES).
4. OUTLINE CONFORMS TO JEDEC OUTLINE MS-012AA.
5. DIMENSION DOES NOT INCLUDE MOLD PROTRUSIONS
MOLD PROTRUSIONS NOT TO EXCEED 0.25 (.006).
6. DIMENSIONS IS THE LENGTH OF LEAD FOR SOLDERING TO A SUBSTRATE..

RECOMMENDED FOOTPRINT



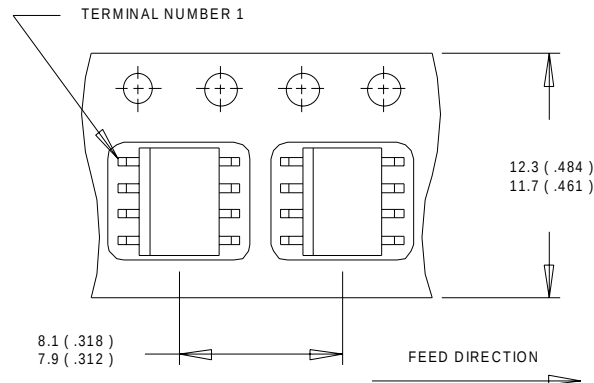
Part Marking Information

EXAMPLE: THIS IS AN IRF7101



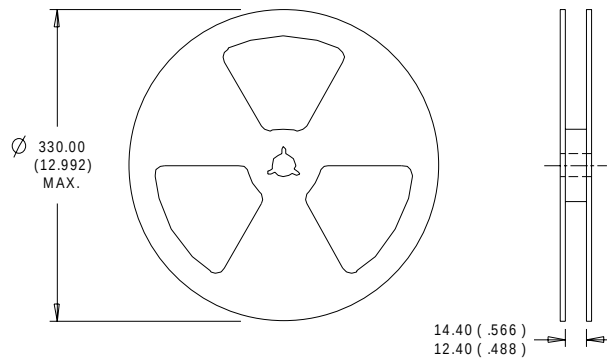
SO-8 Tape & Reel Information

Dimensions are shown in millimeters (inches)



NOTES:

1. CONTROLLING DIMENSION : MILLIMETER.
2. ALL DIMENSIONS ARE SHOWN IN MILLIMETERS(INCHES).
3. OUTLINE CONFORMS TO EIA-481 & EIA-541.



NOTES:

1. CONTROLLING DIMENSION : MILLIMETER.
2. OUTLINE CONFORMS TO EIA-481 & EIA-541.

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