

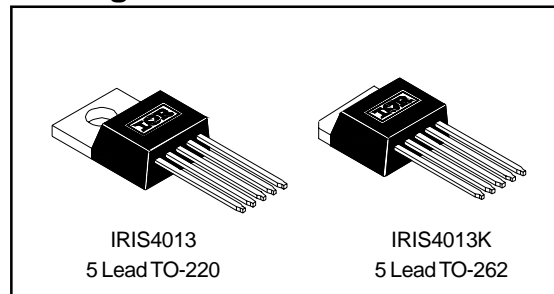
## IRIS4013(K)

### INTEGRATED SWITCHER

#### Features

- Primary current mode control, and secondary voltage mode control
- Vcc Over-voltage protection (latched)
- Over-current & over-temperature protection
- Quasi resonant, variable frequency operation
- 5 pin TO-220 and TO-262 package
- $1.95\Omega$  Rds(on) max/ 650V MOSFET
- **Fully Characterized Avalanche Energy**

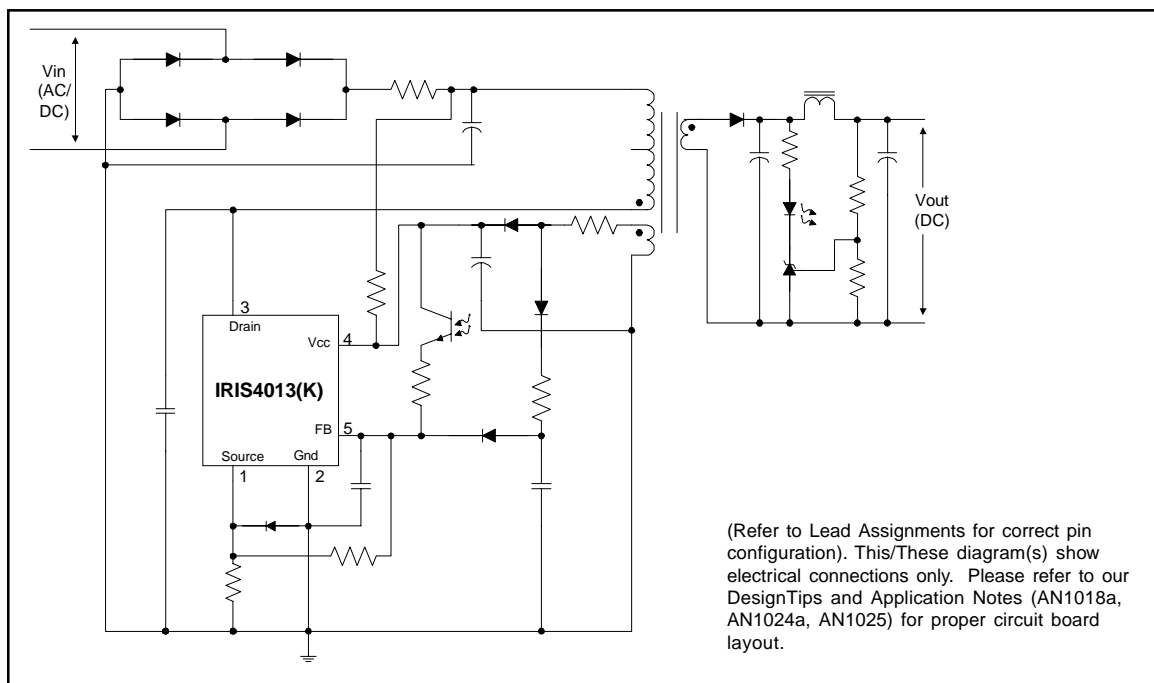
#### Packages



#### Descriptions

The IRIS4013(K) is a dual mode voltage and current controller combined with a MOSFET in a single package. The IRIS4013(K) is designed for use in AC/DC switching power supplies up to 230VAC nominal input, and is capable of powers up to 120W for a universal input. The device operates on a quasi-resonant or Pulse Ratio Control (PRC) basis, and thereby variable frequency operation.

#### Typical Connection Diagram



## Absolute Maximum Ratings

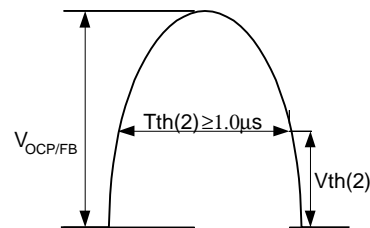
Absolute maximum ratings indicate sustained limits beyond which damage to the device may occur. All voltage parameters are absolute voltages referenced to terminals stated, all currents are defined positive into any lead. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition	Terminals	Max. Ratings	Units	Note
$I_{Dpeak}$	Peak drain current	3-1	12.8	A	Single pulse
$I_{Dmax}$	Maximum switching current	3-1	5.1		$V_{2-3} = 0.78V$ $T_a = -20 \sim +125^\circ C$
$E_{AS}$	Single pulse avalanche energy	3-1	397	mJ	single pulse $I_{Lpeak} = 5.1A$
$V_{CC}$	Power supply voltage	4-3	35	V	
$V_{TH}$	OCP/FB terminal voltage	5-2	6		
$P_{D1}$	Power dissipation for MOSFET	3-1	179	W	With infinite heatsink
			1.3		Without heatsink
$P_{D2}$	Power dissipation for control part (MIC)	4-2	0.8		Specified by $V_{IN} \times I_{IN}$
$R_{thJC}$	Thermal resistance, junction to case	—	0.7	$^\circ C/W$	
$T_J$	Junction temperature	—	-40-125	°C	
$T_S$	Storage temperature	—	-40-125		
$T_f$	Internal frame temperature in operation	—	-20-125		Refer to recommended operating temperature
$T_{OP}$	Ambient operating temperature	—	-20-125		
$T_L$	Lead temp. (soldering, 10 seconds)	—	300		

## Recommended Operating Conditions

Time for input of quasi resonant signals.

For the Quasi resonant signal inputted to the  $V_{OCP/FB}$  terminal at the time of quasi resonant operation, the signal should be wider than  $T_{th}(2)$



**Electrical Characteristics (for Control IC)**

$V_{CC} = 18V$ , ( $T_A = 25^{\circ}C$ ) unless otherwise specified.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$V_{CCUV+}$	$V_{CC}$ supply undervoltage positive going threshold	14.4	16	17.6	V	
$V_{CCHYS}$	$V_{CC}$ supply undervoltage lockout hysteresis	5.4	6.0	6.6		
$I_{QCCUV}$	UVLO mode quiescent current	—	—	100	$\mu A$	$V_{CC} < V_{CCUV+}$
$I_{QCC}$	Quiescent operating $V_{CC}$ supply current	—	—	30	mA	
$T_{OFF(MAX)}$	Maximum OFF time	40	—	60	$\mu sec$	
$T_{TH(2)}$	Minimum input pulse width for quasi resonant signals	—	—	1.0		
$T_{OFF(MIN)}$	Minimum OFF time	—	—	1.5		
$V_{TH(1)}$	OCP/FB terminal threshold voltage 1	0.68	0.73	0.78	V	
$V_{TH(2)}$	OCP/FB terminal threshold voltage 2	1.3	1.45	1.6		
$I_{OCP/FB}$	OCP/FB terminal sink current	1.1	1.35	1.7	mA	
$V_{CC(OVP)}$	$V_{CC}$ overvoltage protection limit	20.5	22.5	24.5	V	
$I_{IN(H)}$	Latch circuit sustaining current	—	—	400	$\mu A$	
$V_{IN(LaOFF)}$	Latch circuit reset voltage	6.6	—	8.4	V	
$T_{J(TSD)}$	Thermal shutdown activation temperature	140	—	—	$^{\circ}C$	

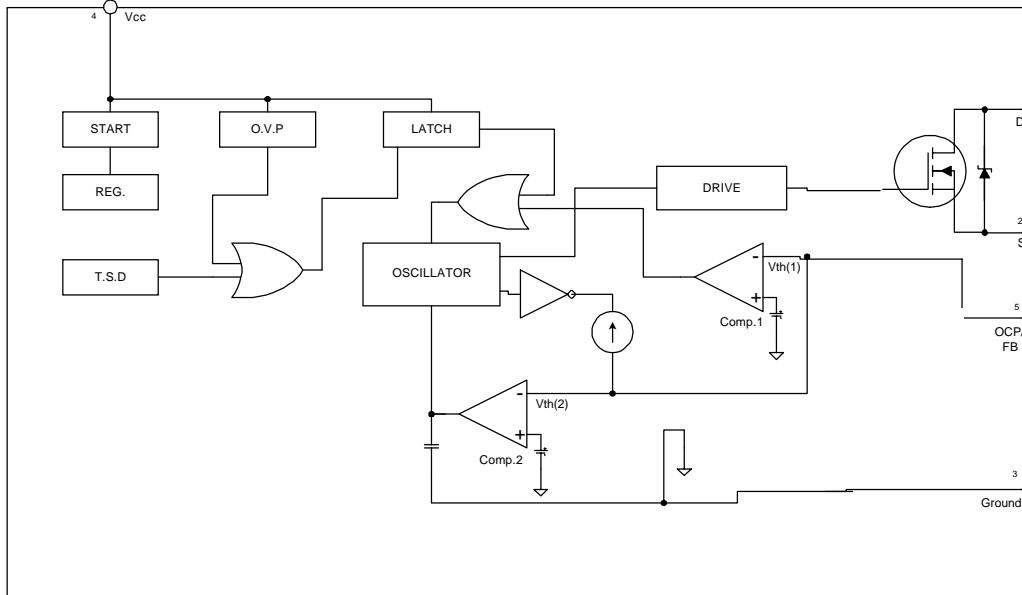
**Electrical Characteristics (for MOSFET)**

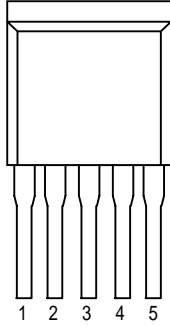
( $T_A = 25^{\circ}C$ ) unless otherwise specified.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
$V_{DSS}$	Drain-to-source breakdown voltage	650	—	—	V	
$I_{DSS}$	Drain leakage current	—	—	300	$\mu A$	$V_{ds}=650V, V_{GS}=0V$
$R_{DS(ON)}$	On-resistance	—	—	1.95	$\Omega$	$V_{3-1}=10V, I_D=5.1A$
$t_r$	Rise time (10% to 90%)	—	—	250	ns	
$\theta_{J-C}$	Thermal resistance	—	—	0.7	$^{\circ}C/W$	Between junction and case

# IRIS4013(K)

## Block Diagram



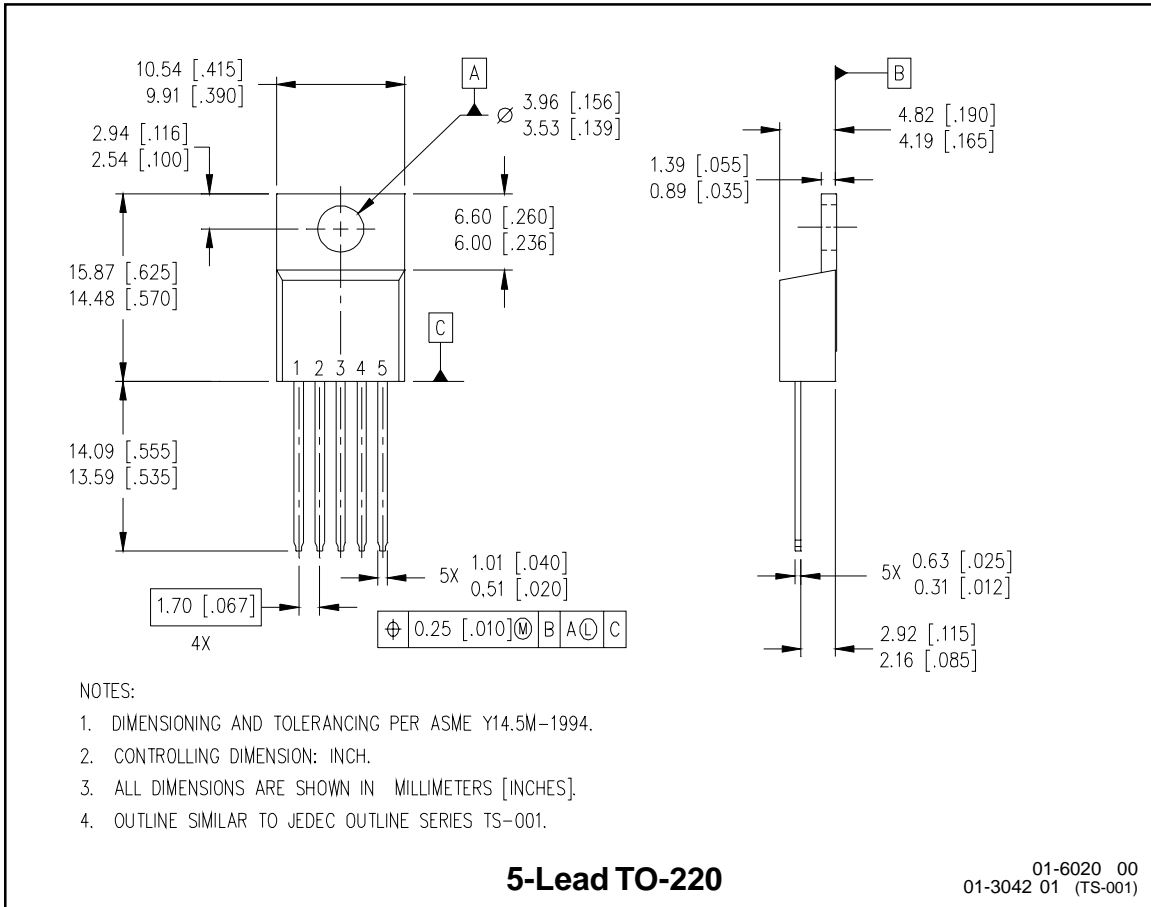
Lead Assignments	Pin #	Symbol	Description
	1	S	MOSFET Source terminal
	2	Ground	Ground terminal
	3	D	MOSFET Drain terminal
	4	Vcc	Control circuit supply voltage
	5	OCP/FB	Overcurrent detection, and Voltage mode control feedback signal

## Other Functions

O.V.P. – Overvoltage Protection Circuit

T.S.D. – Thermal Shutdown Circuit

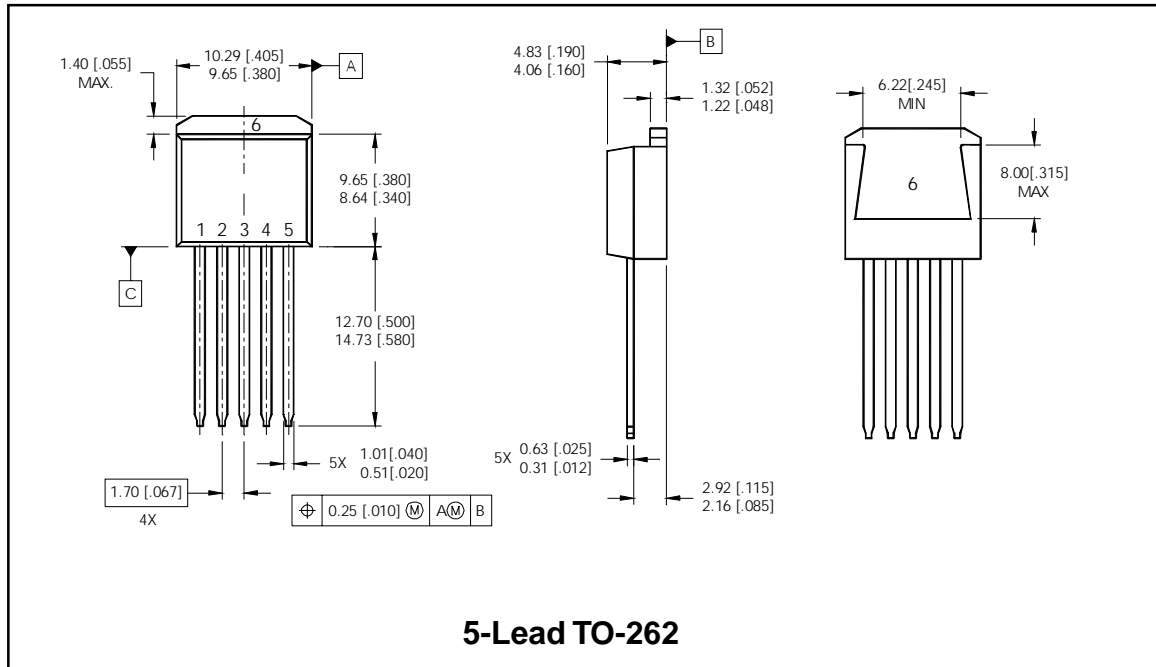
**Case outline**



# IRIS4013(K)

International  
**IR** Rectifier

## Case outline



International  
**IR** Rectifier  
**IR WORLD HEADQUARTERS:** 233 Kansas Street, El Segundo, California 90245 Tel: (310) 252-7105  
*Data and specifications subject to change without notice. 10/16/2001*