SOT-23 Current Sensing IC

Features

- RDS(on) or VCE(on) current sensing
- Eliminates external current sensing resistors
- 600V blocking capability
- Programmable ratio
- Temperature compensation possible
- No VCC required
- Gate drive on/off sync input
- Low gate input capacitance
- Internal filter delay at turn-on (200nsec typ.)
- Internal 20.8 V zener clamps on GATE and CS pins
- Excellent latch immunity on all inputs & outputs
- Integrated ESD protection on all pins
- Tiny 5-pin SOT-23 package

Applications

- MOSFET or IGBT current sensing
- General purpose switched mode power electronics

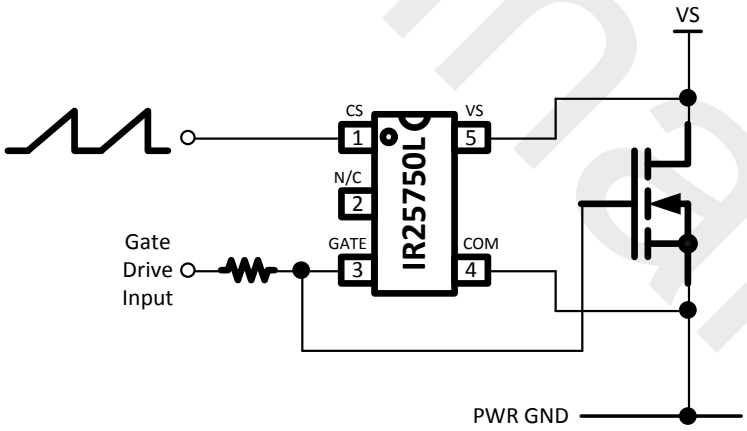
Description

The IR25750L is a novel current sensing IC that extracts the voltage across the internal RDSon of a power MOSFET, or the VCE(on) of an IGBT, during the switch on-time. IR's proprietary 600V HVIC technology then blocks the high drain voltage to during the MOSFET or IGBT off-time. This IC allows for external current sensing resistors to be eliminated for reducing power losses and increasing overall system efficiency. The IC includes a gate drive input that provides VCC supply voltage to the IC and synchronizes the internal sensing circuit to the on and off times of the switch. Programmability and temperature compensation are also possible.

Package Options

5 Lead SOT 23

Typical Connection Diagram



Ordering Information

Base Part Number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IR25750LPBF	SOT23-5L	Tape and Reel	3000	IR25750LTRPBF

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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 COM, all currents are defined positive into any pin. The thermal resistance and power dissipation ratings are measured under board mounted and still air conditions.

Symbol	Definition		Min.	Max.	Units
V_S	VS pin voltage		-0.3	625	V
V_{GATE}	GATE pin voltage		-0.3	V_{CLAMP} †	
V_{CS}	CS pin voltage				
P_D	Package power dissipation @ Ta ≤ +25 ºC	SOT-23 5L	—	250	mW
$R\Theta_{JA}$	Thermal resistance, junction to ambient	SOT-23 5L	—	191	ºC/W
T_J	Junction temperature		-55	150	ºC
T_S	Storage temperature				
T_L	IC pin temperature (soldering, 10 seconds)		—	300	

† This IC contains a 20.8V voltage clamp structure between the GATE and COM pins, and, between the CS and COM pins. Please note that this pin should not be driven by a DC, low impedance power source greater than the VCLAMP specified in the Electrical Characteristics section.

Recommended Operating Conditions

For proper operation the device should be used within the recommended conditions.

Symbol	Definition	Min.	Max.	Units
V_S	VS pin voltage	-3.0††	600	V
V_{GATE}	GATE pin voltage	COM	V_{CLAMP}	
V_{CS}	CS pin voltage			
T_J	Junction temperature	-40	125	ºC

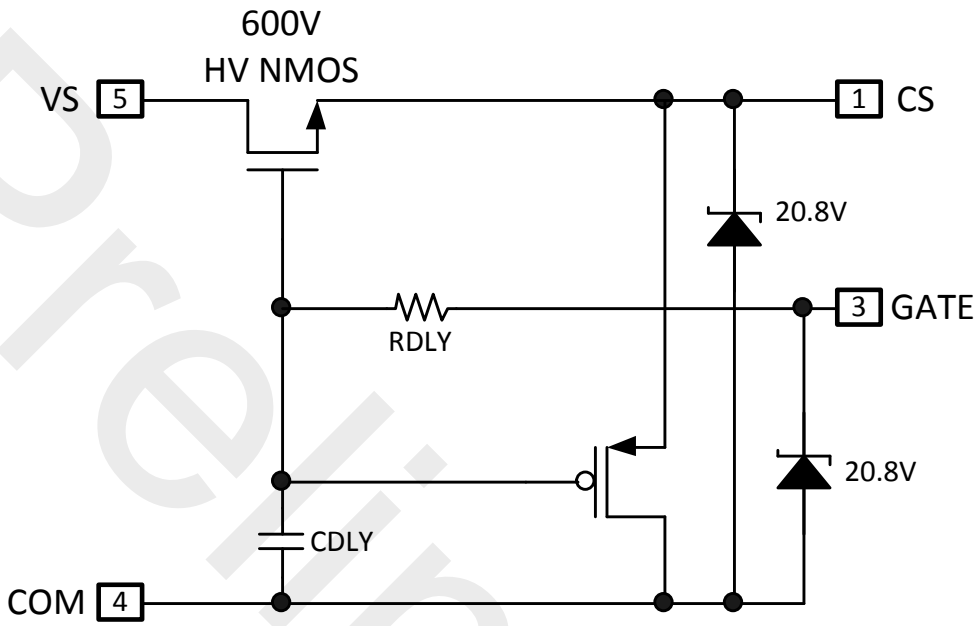
†† Care should be taken to avoid output switching conditions where the VS node rings inductively below ground by more than 5V.

Electrical Characteristics

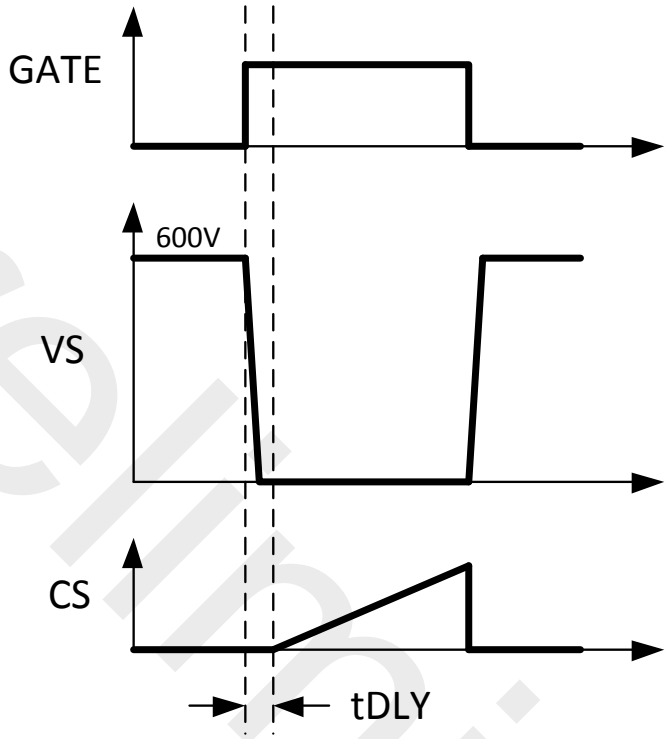
T_A = 25 °C unless otherwise specified. All parameters are referenced to COM.

Symbol	Definition	Min.	Typ.	Max.	Units	Test Conditions
GATE Pin Characteristics						
t_{DLY}	GATE-to-CS rising-edge blank delay time	—	200	—	nsec	V_{GATE} = rising edge
V_{CLAMP1}	GATE pin internal Zener clamp voltage	21.1	22.5	24.0	V	I_{GATE} = 1mA
High-Voltage Switching Node Input (VS Pin) Characteristics						
I_{LK}	Offset supply leakage current	—	—	50	µA	V_{GATE} = COM, V_S = 600V
R_{VS_CS}	VS-to-CS 'ON' resistance	—	6.2	—	kΩ	V_{GATE} = 15V
CS Pin Characteristics						
V_{CS_LOW}	CS pin voltage during GATE pin 'low' state	—	COM	—	V	V_{GATE} = COM
V_{CLAMP2}	CS pin internal Zener clamp voltage	—	20.8	—		I_{CS} = 1mA

Functional Block Diagram



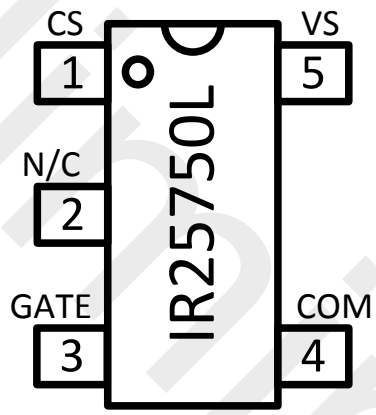
Timing Diagram



Pin Definitions

Symbol	Description
CS	Current sense output
N/C	No connect
GATE	VCC supply and on/off sync input
COM	IC ground
VS	Switch drain or collector input sensing node

Pin Assignments



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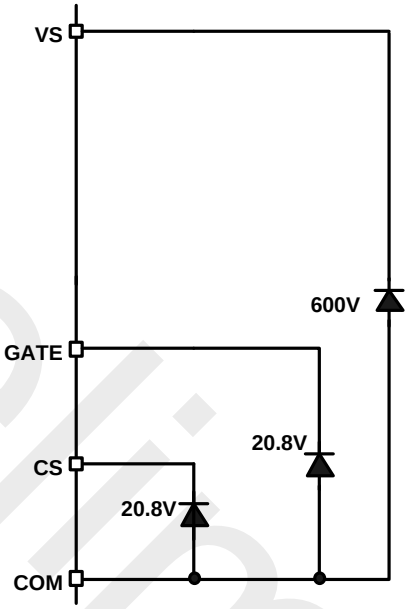
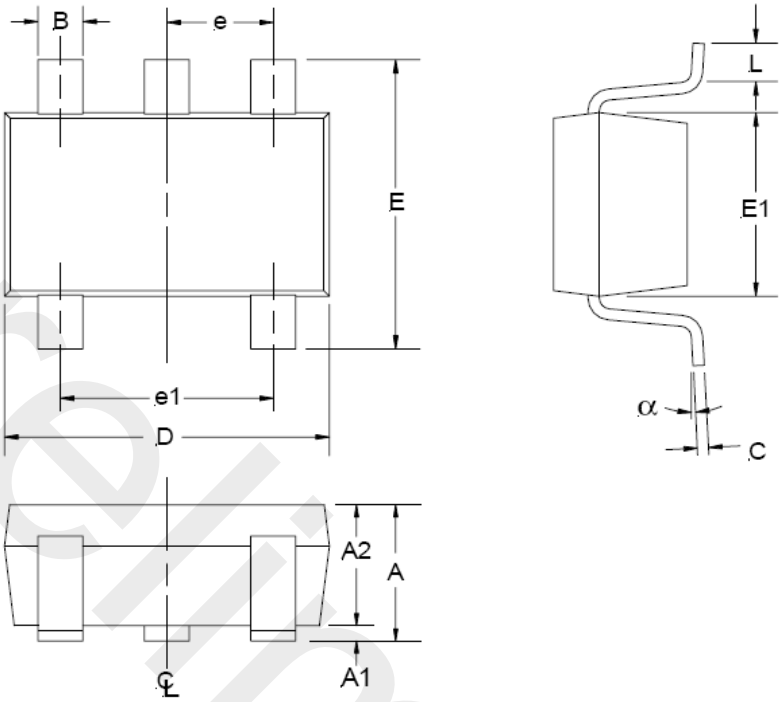
Input / Output Pin Equivalent Circuit Diagrams



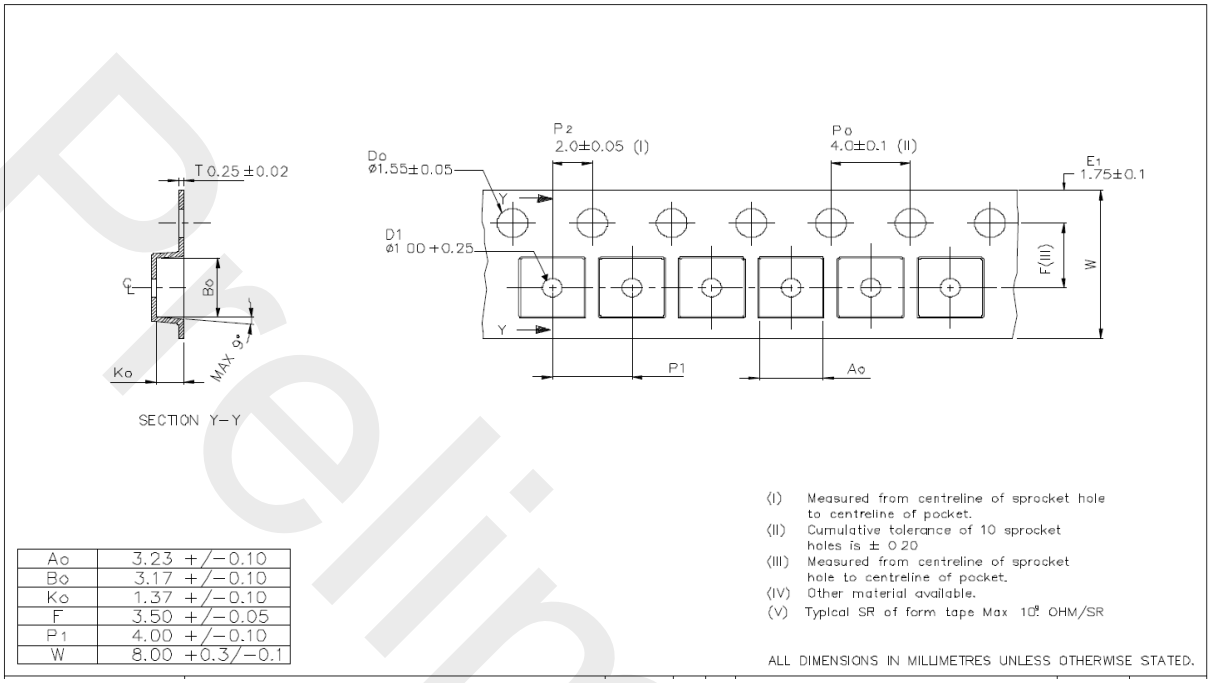
Package Details: 5 Lead SOT23



SYMBOL	MIN	MAX
A	0.90	1.45
A1	0.00	0.15
A2	0.90	1.30
B	0.25	0.50
C	0.09	0.20
D	2.80	3.00
E	2.60	3.00
E1	1.50	1.75
e	0.95 REF	
e1	1.90 REF	
L	0.35	0.55
α	08	108

NOTE: ALL MEASUREMENTS ARE IN MILLIMETERS.

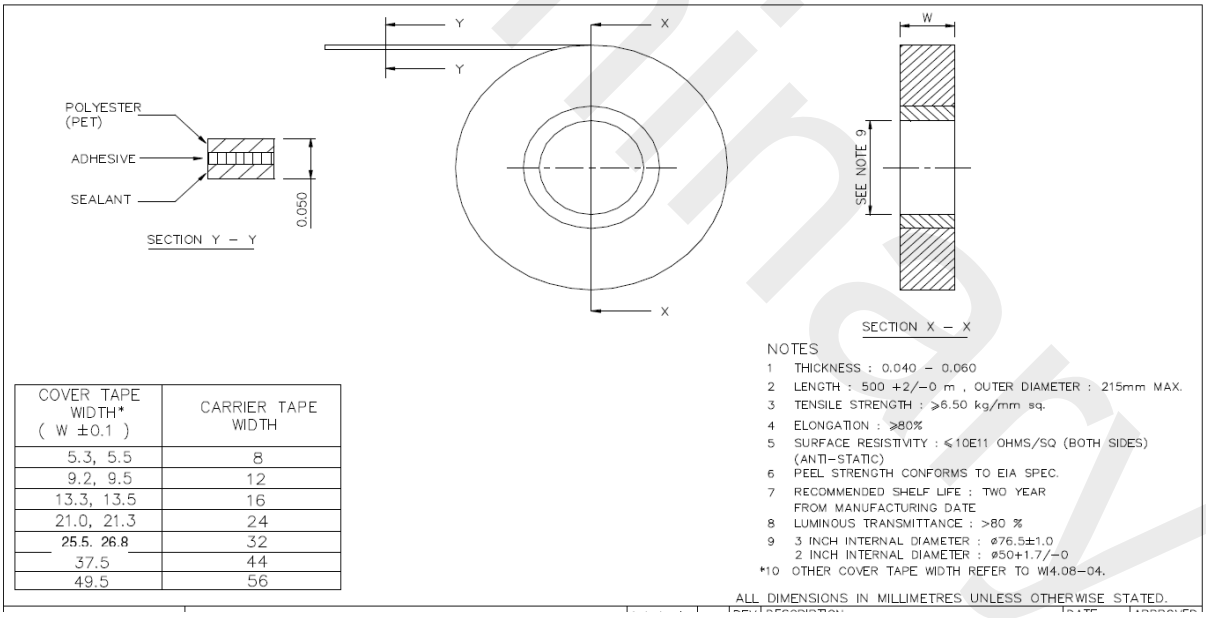
Tape and Reel Details: 5 Lead SOT23



Ao	3.23 +/−0.10
Bo	3.17 +/−0.10
Ko	1.37 +/−0.10
F	3.50 +/−0.05
P1	4.00 +/−0.10
W	8.00 +0.3/−0.1

(I) Measured from centreline of sprocket hole to centreline of pocket.
(II) Cumulative tolerance of 10 sprocket holes is ± 0.20
(III) Measured from centreline of sprocket hole to centreline of pocket.
(IV) Other material available.
(V) Typical SR of form tape Max 10^{9} OHM/SR

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

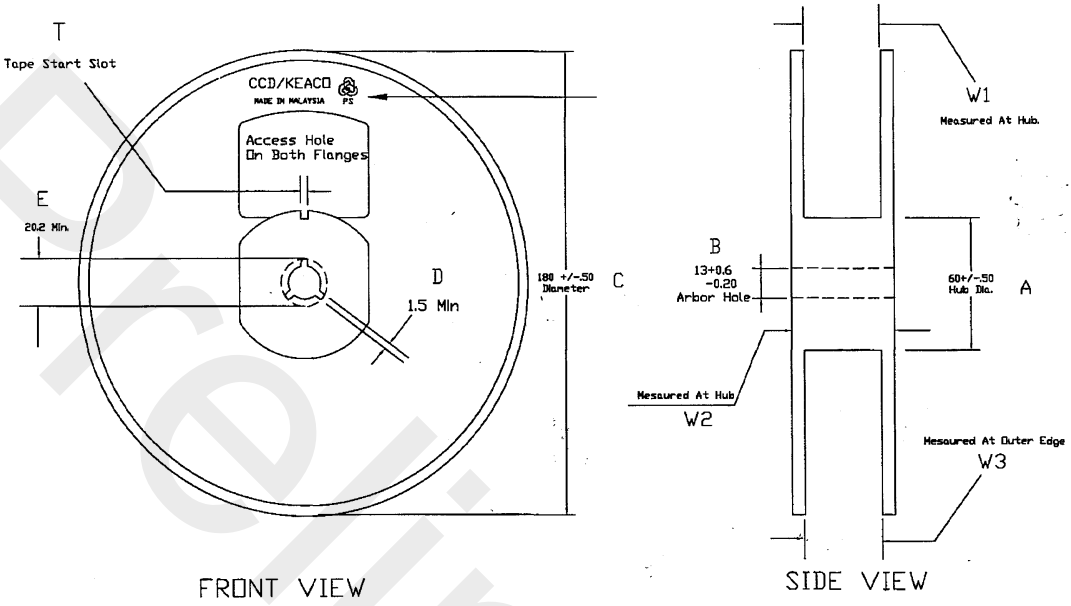


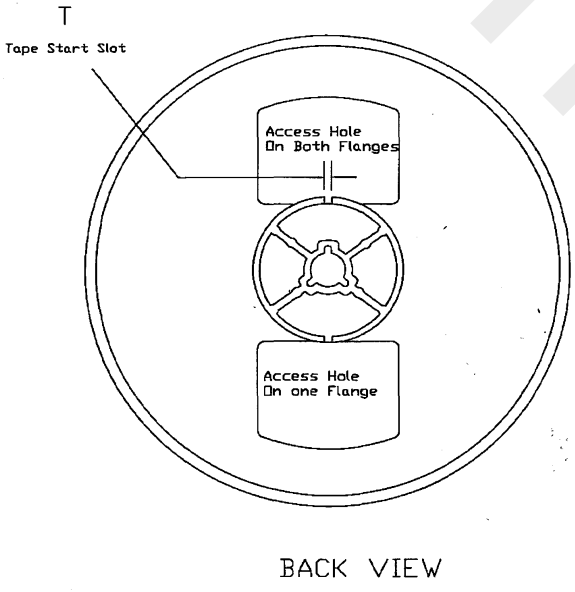
COVER TAPE WIDTH* (W ±0.1)	CARRIER TAPE WIDTH
5.3, 5.5	8
9.2, 9.5	12
13.3, 13.5	16
21.0, 21.3	24
25.5, 26.8	32
37.5	44
49.5	56

NOTES
1 THICKNESS : 0.040 – 0.060
2 LENGTH : 500 +2/−0 m , OUTER DIAMETER : 215mm MAX.
3 TENSILE STRENGTH : >6.50 kg/mm sq.
4 ELONGATION : ≥80%
5 SURFACE RESISTIVITY : ≤10E11 OHMS/SQ (BOTH SIDES) (ANTI–STATIC)
6 PEEL STRENGTH CONFORMS TO EIA SPEC.
7 RECOMMENDED SHELF LIFE : TWO YEAR FROM MANUFACTURING DATE
8 LUMINOUS TRANSMITTANCE : >80 %
9 3 INCH INTERNAL DIAMETER : ø76.5±1.0
2 INCH INTERNAL DIAMETER : ø50+1.7/−0
*10 OTHER COVER TAPE WIDTH REFER TO W14.08–04.

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

Tape and Reel Details: 5 Lead SOT23

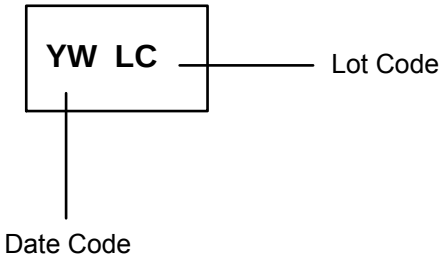




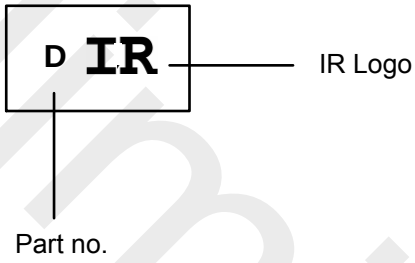
NOTE:
1. MATERIAL : POLYSTRENE
2. SURFACE RESISTIVITY : </= 10E11 OHMS/SQ
(EXTERNAL OR DIPPED)
3. STATIC DECAY : < 2SEC. AT 50%RH

Part Marking Information: 5 Lead SOT23

Top Marking



Bottom Marking



Qualification Information†

Qualification Level		Industrial†† (per JEDEC JESD 47)	
		Comments: This family of ICs has passed JEDEC's Industrial qualification. IR's Consumer qualification level is granted by extension of the higher Industrial level.	
Moisture Sensitivity Level		SOT-23	MSL1††† (per IPC/JEDEC J-STD-020)
ESD	Machine Model	Class A (per JEDEC standard EIA/JESD22-A115-A)	
	Human Body Model	Class 1B (per ANSI/ESDA/JEDEC standard JS-001-2012)	
IC Latch-Up Test		Class I, Level A (per JESD78)	
RoHS Compliant		Yes	

† Qualification standards can be found at International Rectifier's web site http://www.irf.com/

†† Higher qualification ratings may be available should the user have such requirements. Please contact your International Rectifier sales representative for further information.

††† Higher MSL ratings may be available for the specific package types listed here. Please contact your International Rectifier sales representative for further information.

For technical support, please contact IR's Technical Assistance Center
http://www.irf.com/technical-info/

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