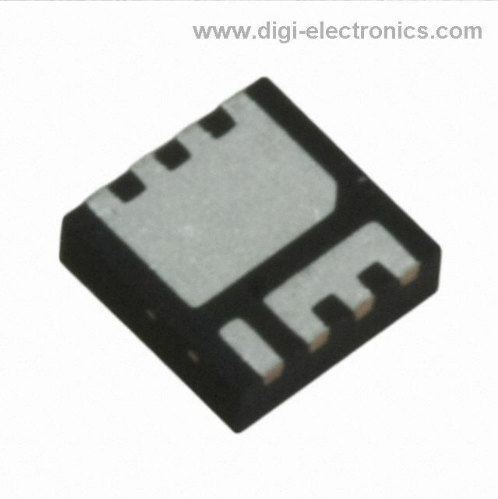
IRFH7923TRPBF Datasheet



https://www.DiGi-Electronics.com

DiGi Electronics Part Number	IRFH7923TRPBF-DG
Manufacturer	Infineon Technologies
Manufacturer Product Number	IRFH7923TRPBF
Description	MOSFET N-CH 30V 15A PQFN56
Detailed Description	N-Channel 30 V 15A (Ta), 33A (Tc) Surface Mount PQFN (5x6) Single Die

Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

Purchase and inquiry

Manufacturer Product Number:	Manufacturer:
IRFH7923TRPBF	Infineon Technologies
Series:	Product Status:
-	Obsolete
FET Type:	Technology:
N-Channel	MOSFET (Metal Oxide)
Drain to Source Voltage (Vdss):	Current - Continuous Drain (Id) @ 25°C:
30 V	15A (Ta), 33A (Tc)
Rds On (Max) @ Id, Vgs:	Vgs(th) (Max) @ Id:
8.7mOhm @ 15A, 10V	2.35V @ 25μA
Gate Charge (Qg) (Max) @ Vgs:	Input Capacitance (Ciss) (Max) @ Vds:
13 nC @ 4.5 V	1095 pF @ 15 V
FET Feature:	Mounting Type:
-	Surface Mount
Supplier Device Package:	Package / Case:
PQFN (5x6) Single Die	8-PowerVDFN

Environmental & Export classification

Moisture Sensitivity Level (MSL):	REACH Status:
2 (1 Year)	REACH Unaffected
ECCN:	HTSUS:
EAR99	8541.29.0095

International
IOR Rectifier

PD - 96139A

IRFH7923PbF

HEXFET® Power MOSFET

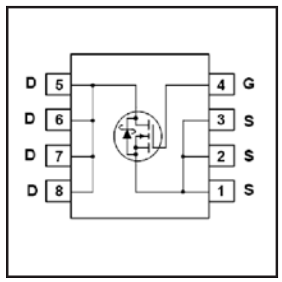
V_{DSS}	$R_{DS(on)}$ max	Qg
30V	8.7mΩ@V_{GS} = 10V	8.7nC

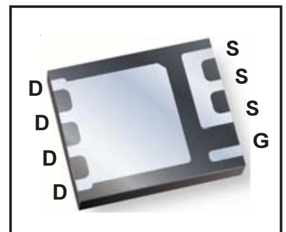
Applications

- High Frequency Point-of-Load Synchronous Buck Converter for Applications in Neworking & Computing Systems
- Optimized for Control FET Applications

Benefits

- Very low $R_{DS(ON)}$ at 4.5V V_{GS}
- Low Gate Charge
- Fully Characterized Avalanche Voltage and Current
- 100% Tested for R_G
- Lead-Free (Qualified up to 260°C Reflow)
- RoHS compliant (Halogen Free)
- Low Thermal Resistance
- Large Source Lead for more reliable Soldering





PQFN

Absolute Maximum Ratings

	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	30	V
V_{GS}	Gate-to-Source Voltage	± 20	
I_D @ T_A = 25°C	Continuous Drain Current, V_{GS} @ 10V	15	A
I_D @ T_A = 70°C	Continuous Drain Current, V_{GS} @ 10V	12	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	33	
I_{DM}	Pulsed Drain Current ①	120	
P_D @T_A = 25°C	Power Dissipation ⑤	3.1	W
P_D @T_A = 70°C	Power Dissipation ⑤	2	
	Linear Derating Factor ⑤	0.03	W/°C
T_J T_{STG}	Operating Junction and Storage Temperature Range	-55 to + 150	°C

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	—	8.3	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑤	—	40	

Notes ① through ⑤ are on page 9

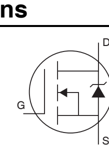
Static @ T_J = 25°C (unless otherwise specified)

	Parameter	Min.	Typ.	Max.	Units	Conditions
BV_{DSS}	Drain-to-Source Breakdown Voltage	30	–––	–––	V	V_{GS} = 0V, I_D = 250µA
$\Delta BV_{DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.024	–––	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	6.8	8.7	mΩ	V_{GS} = 10V, I_D = 15A ③
		–––	9.3	11.9		V_{GS} = 4.5V, I_D = 12A ③
$V_{GS(th)}$	Gate Threshold Voltage	1.35	1.8	2.35	V	V_{DS} = V_{GS}, I_D = 25µA
$\Delta V_{GS(th)}$	Gate Threshold Voltage Coefficient	–––	-5.8	–––	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	1.0	µA	V_{DS} = 24V, V_{GS} = 0V
		–––	–––	150		V_{DS} = 24V, V_{GS} = 0V, T_J = 125°C
I_{GSS}	Gate-to-Source Forward Leakage	–––	–––	100	nA	V_{GS} = 20V
	Gate-to-Source Reverse Leakage	–––	–––	-100		V_{GS} = -20V
gfs	Forward Transconductance	29	–––	–––	S	V_{DS} = 15V, I_D = 12A
Q_g	Total Gate Charge	–––	8.7	13	nC	
Q_{gs1}	Pre-Vth Gate-to-Source Charge	–––	1.8	–––		V_{DS} = 15V
Q_{gs2}	Post-Vth Gate-to-Source Charge	–––	1.1	–––		V_{GS} = 4.5V
Q_{gd}	Gate-to-Drain Charge	–––	2.7	–––		I_D = 12A
Q_{godr}	Gate Charge Overdrive	–––	3.1	–––		See Fig.17 & 18
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	–––	3.8	–––		
Q_{oss}	Output Charge	–––	4.9	–––	nC	V_{DS} = 16V, V_{GS} = 0V
R_G	Gate Resistance	–––	2.0	3.0	Ω	
$t_{d(on)}$	Turn-On Delay Time	–––	7.1	–––	ns	V_{DD} = 15V, V_{GS} = 4.5V
t_r	Rise Time	–––	8.7	–––		I_D = 12A
$t_{d(off)}$	Turn-Off Delay Time	–––	8.6	–––		R_G=1.8Ω
t_f	Fall Time	–––	4.9	–––		See Fig.15
C_{iss}	Input Capacitance	–––	1095	–––	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	–––	235	–––		V_{DS} = 15V
C_{rss}	Reverse Transfer Capacitance	–––	110	–––		f = 1.0MHz

Avalanche Characteristics

	Parameter	Typ.	Max.	Units
E_{AS}	Single Pulse Avalanche Energy ②	–––	27	mJ
I_{AR}	Avalanche Current ①	–––	12	A

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	–––	–––	3.9	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	–––	–––	120		
V_{SD}	Diode Forward Voltage	–––	–––	1.0	V	T_J = 25°C, I_S = 12A, V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	–––	12	18	ns	T_J = 25°C, I_F = 12A, V_{DD} = 15V
Q_{rr}	Reverse Recovery Charge	–––	11	17	nC	di/dt = 300A/µs ③
t_{on}	Forward Turn-On Time	Intrinsic turn-on time is negligible (turn-on is dominated by LS+LD)				

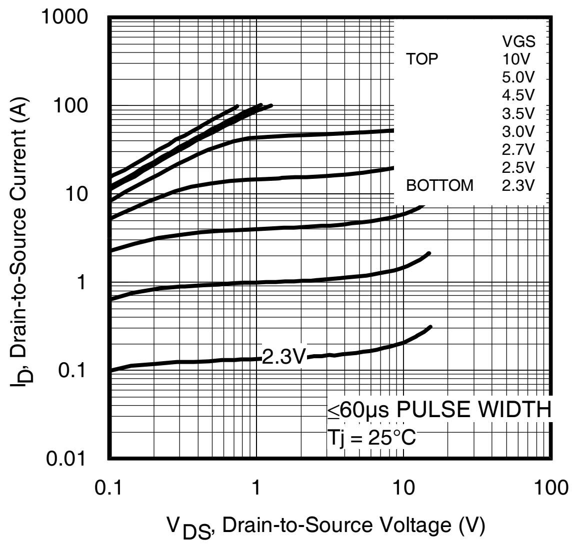


Fig 1. Typical Output Characteristics

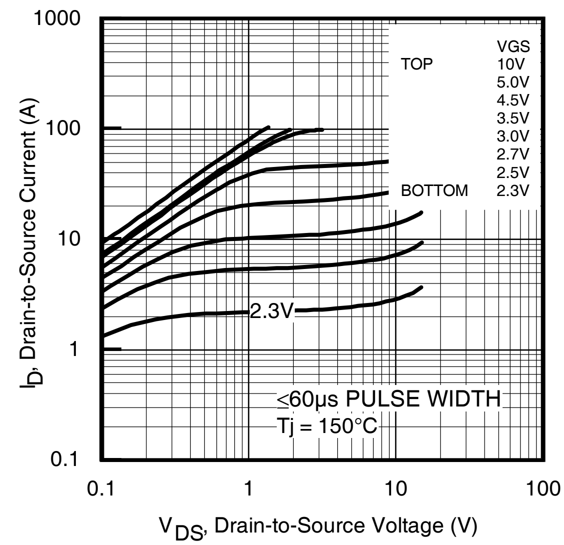


Fig 2. Typical Output Characteristics

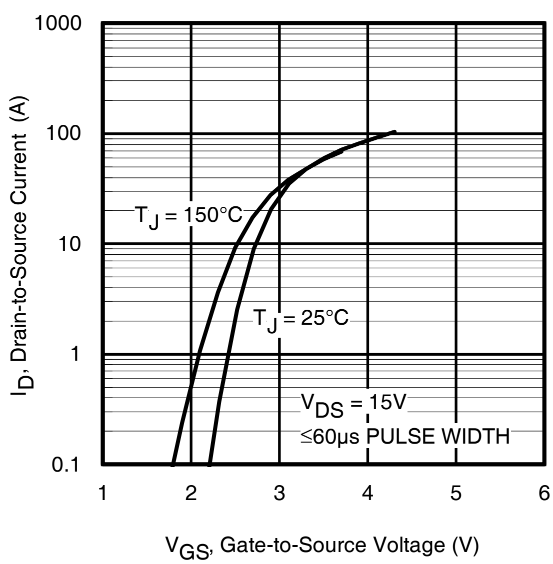


Fig 3. Typical Transfer Characteristics

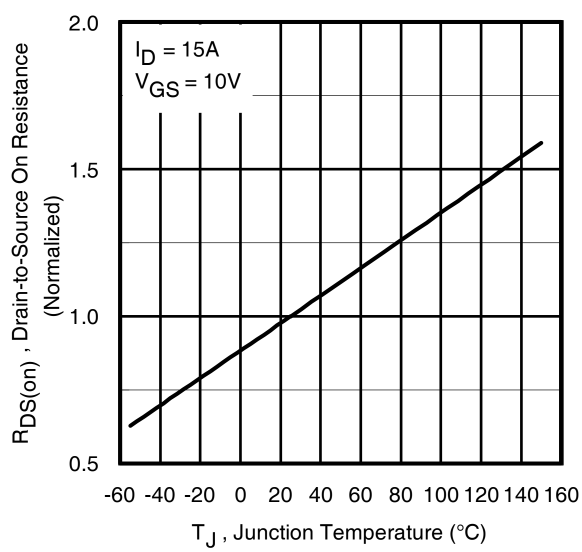


Fig 4. Normalized On-Resistance Vs. Temperature

IRFH7923PbF

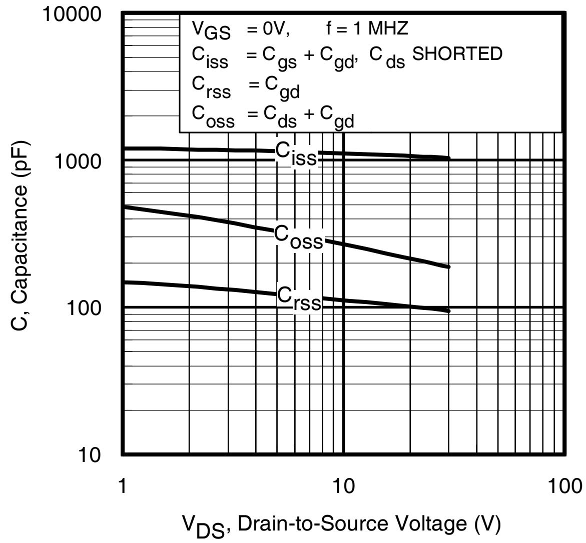


Fig 5. Typical Capacitance Vs. Drain-to-Source Voltage

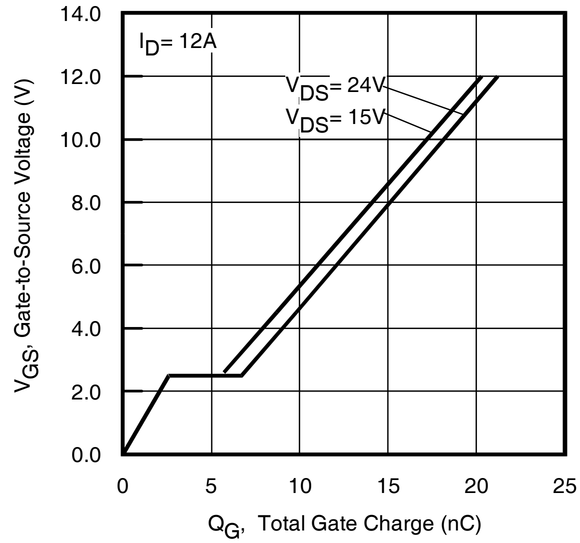


Fig 6. Typical Gate Charge Vs. Gate-to-Source Voltage

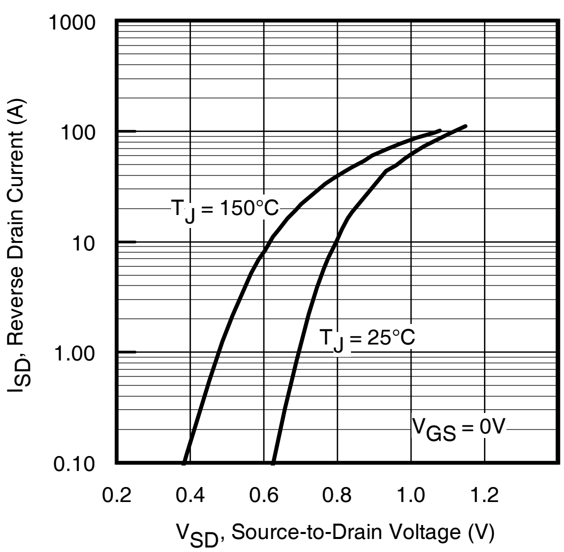


Fig 7. Typical Source-Drain Diode Forward Voltage

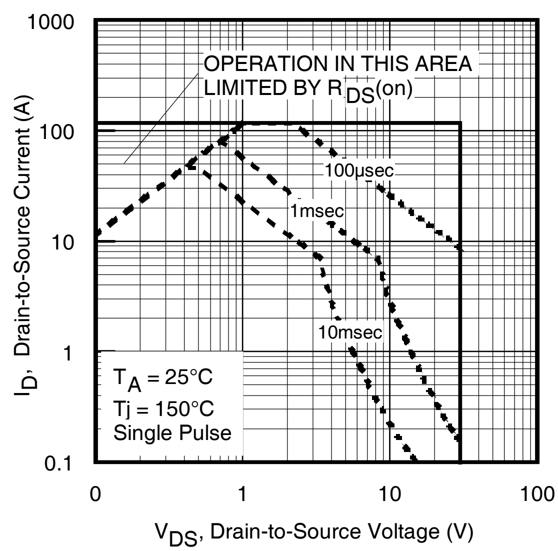


Fig 8. Maximum Safe Operating Area

IRFH7923PbF

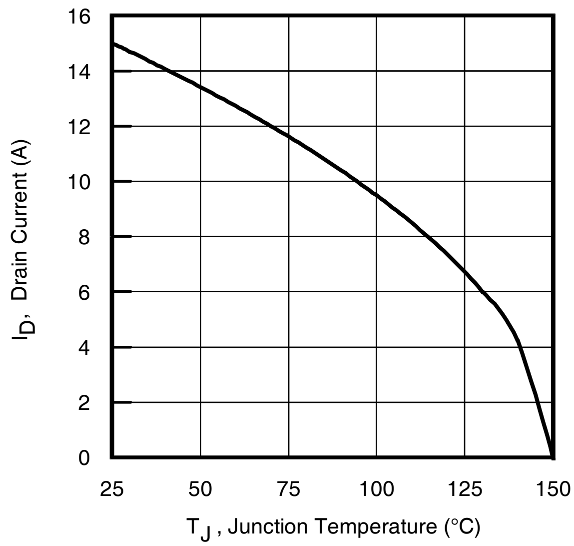


Fig 9. Maximum Drain Current Vs. Ambient Temperature

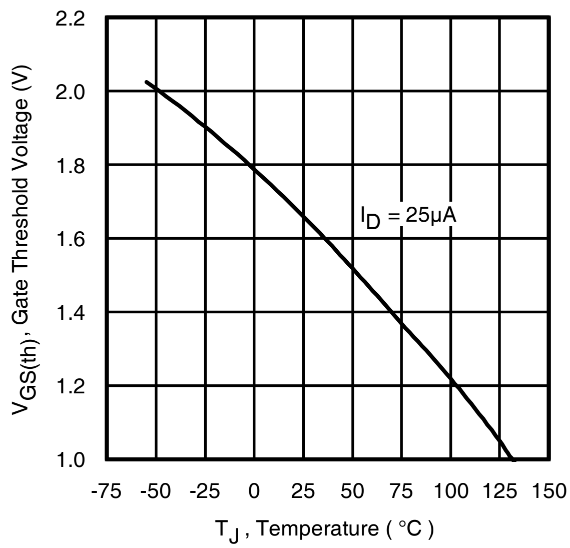
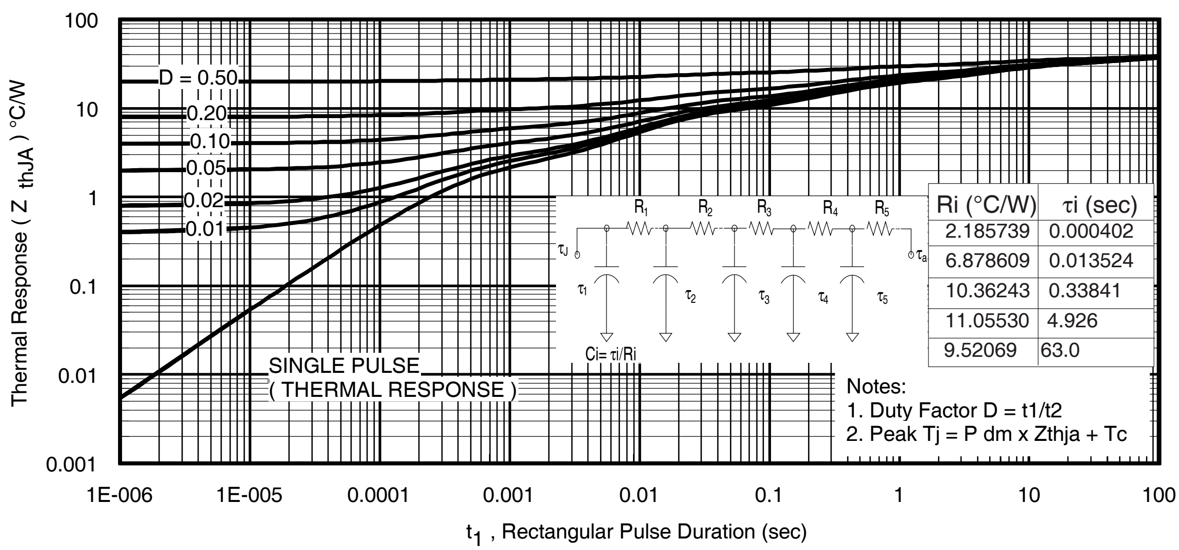


Fig 10. Threshold Voltage Vs. Temperature



Ri (°C/W)	τi (sec)
2.185739	0.000402
6.878609	0.013524
10.36243	0.33841
11.05530	4.926
9.52069	63.0

Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Ambient

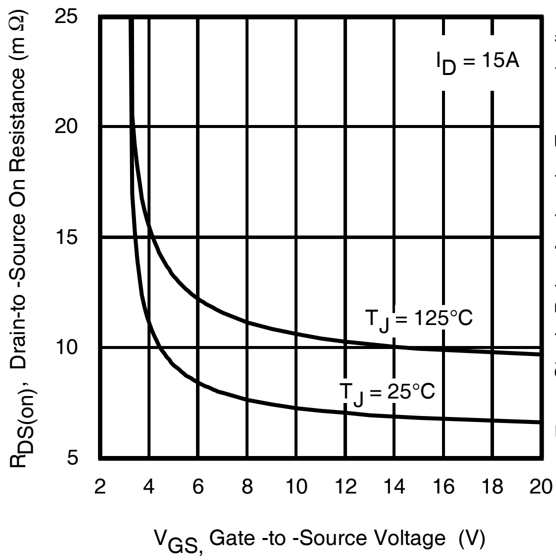


Fig 12. On-Resistance vs. Gate Voltage

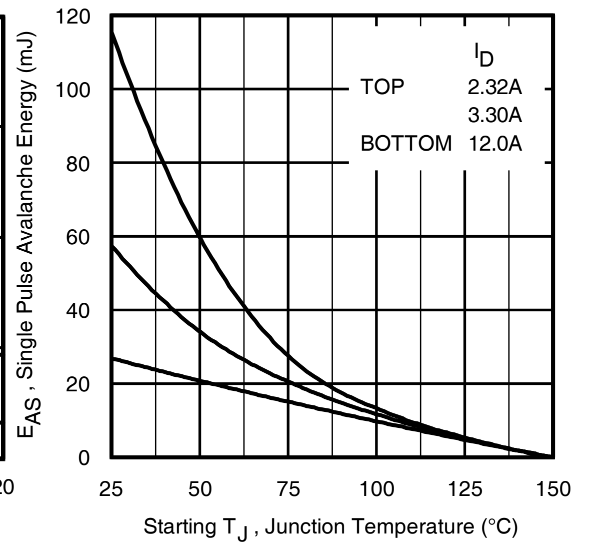


Fig 13. Maximum Avalanche Energy vs. Drain Current

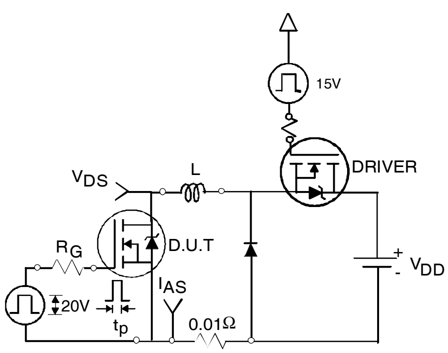


Fig 14a. Unclamped Inductive Test Circuit

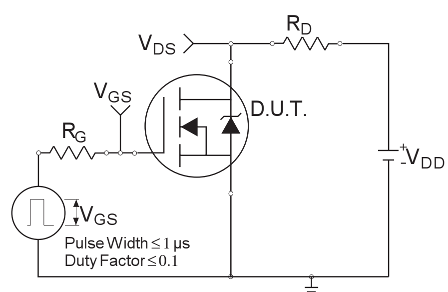


Fig 15a. Switching Time Test Circuit

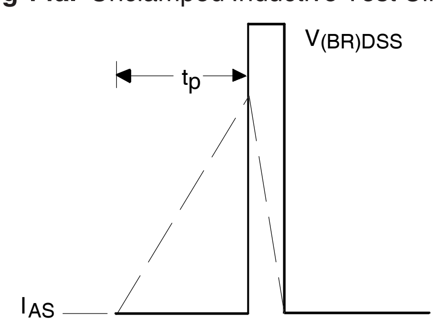


Fig 14b. Unclamped Inductive Waveforms

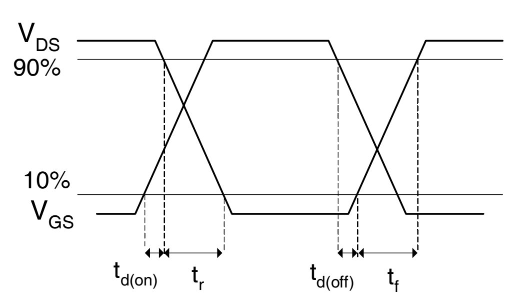


Fig 15b. Switching Time Waveforms

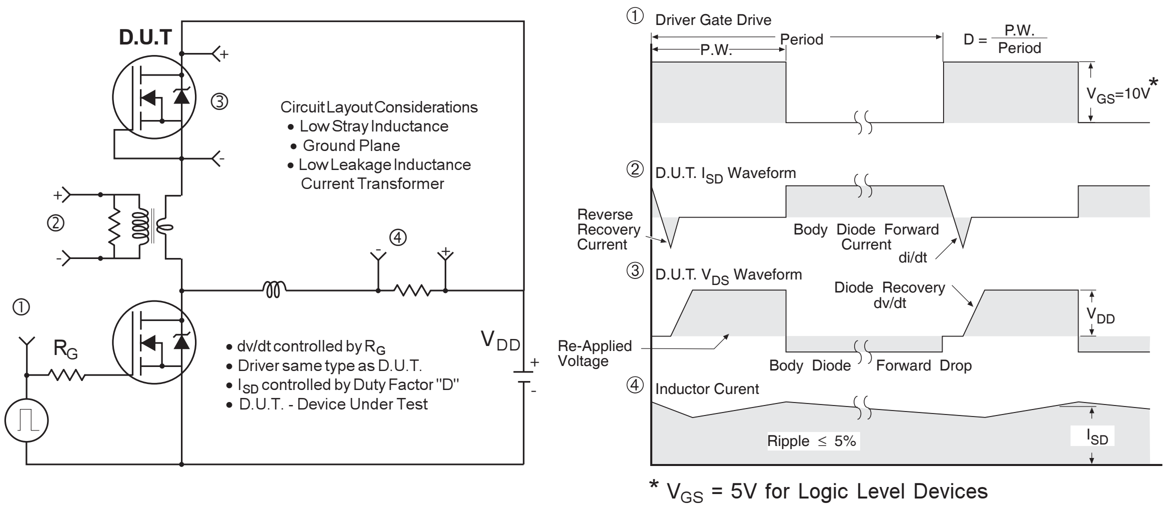


Fig 16. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

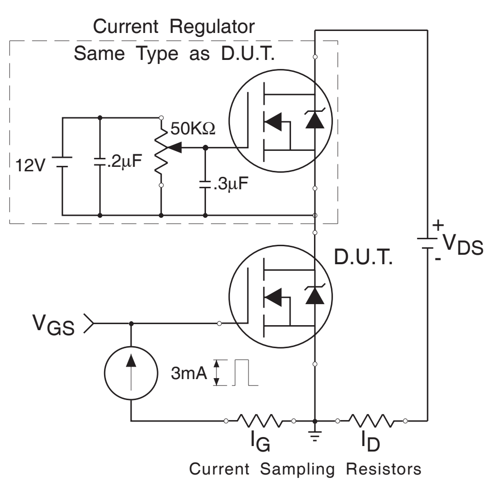


Fig 17. Gate Charge Test Circuit

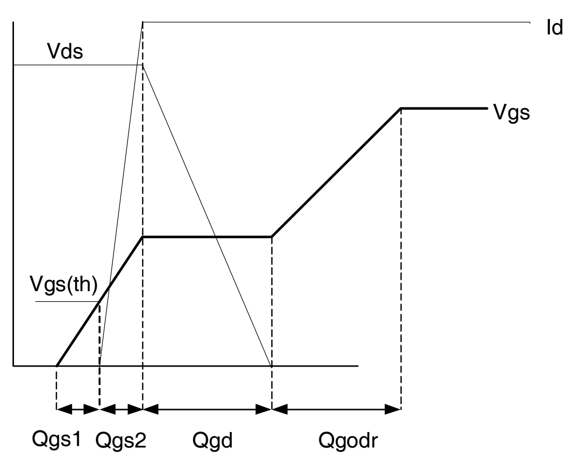
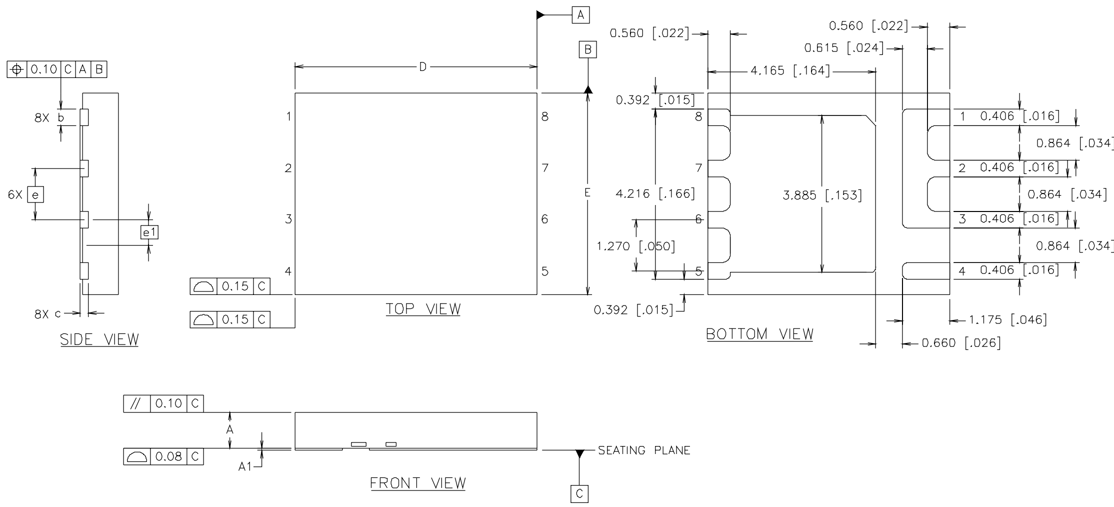


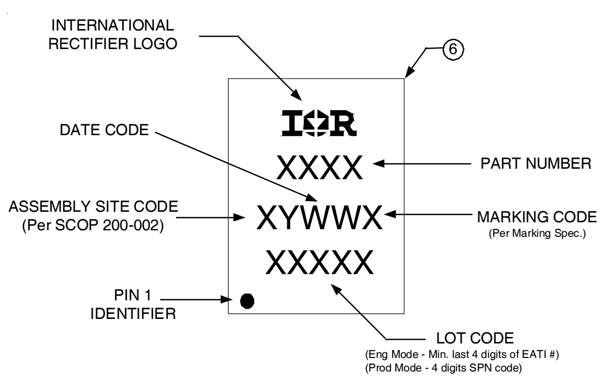
Fig 18. Gate Charge Waveform

PQFN Package Details



DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	.0315	.0394	0.800	1.000
A1	.0000	.0020	0.000	0.050
b	.0140	.0180	0.356	0.456
c	.0080 REF.		0.203 REF.	
D	.2362 BASIC		6.0 BASIC	
E	.1969 BASIC		5.0 BASIC	
e	.0500 BASIC		1.270 BASIC	
e1	.0250 BASIC		0.635 BASIC	

PQFN Part Marking



TOP MARKING (LASER)

Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

International
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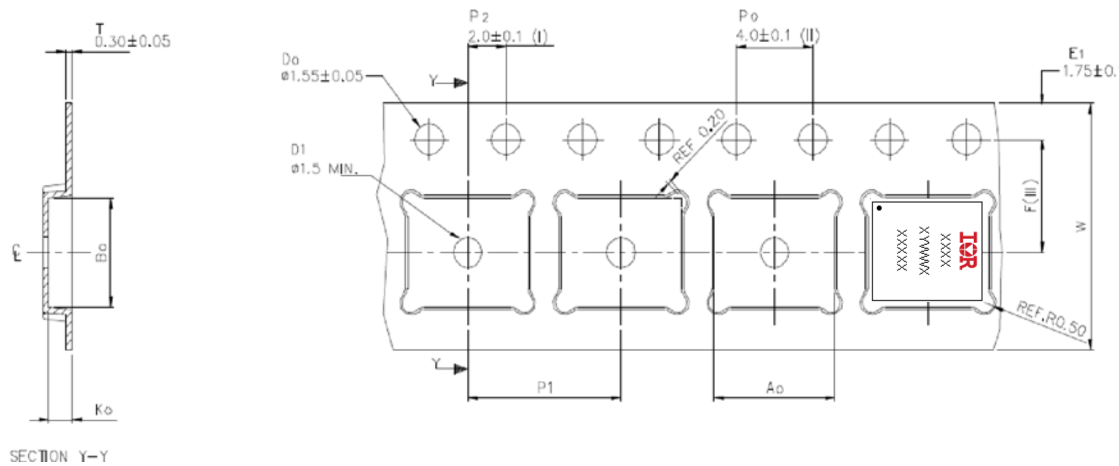
IRFH7923PbF

PQFN Tape and Reel



Ao	6.30 +/– 0.1
Bo	5.30 +/– 0.1
Ko	1.20 +/– 0.1
F	5.50 +/– 0.1
P1	8.00 +/– 0.1
W	12.00 +/– 0.3

(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/SQ

ALL DIMENSIONS IN MILLIMETRES UNLESS OTHERWISE STATED.

Note: For the most current drawing please refer to IR website at: http://www.irf.com/package/

Notes:
① Repetitive rating; pulse width limited by max. junction temperature.
② Starting T_J = 25°C, L = 0.39mH, R_G = 25Ω, I_{AS} = 12A.
③ Pulse width ≤ 400µs; duty cycle ≤ 2%.
④ Rthjc is guaranteed by design
⑤ When mounted on 1 inch square 2 oz copper pad on 1.5x1.5 in. board of FR-4 material.

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
IOR Rectifier

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