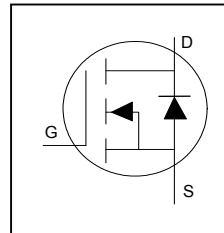


**Application**

- Brushed Motor drive applications
- BLDC Motor drive applications
- Battery powered circuits
- Half-bridge and full-bridge topologies
- Synchronous rectifier applications
- Resonant mode power supplies
- OR-ing and redundant power switches

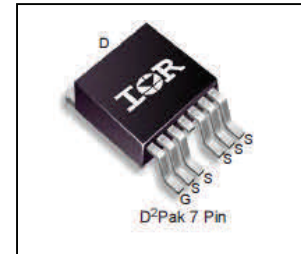
HEXFET® Power MOSFET



$V_{DS}$	75V
$R_{DS(on)}$ typ.	2.6mΩ
	max
$I_D$	197A

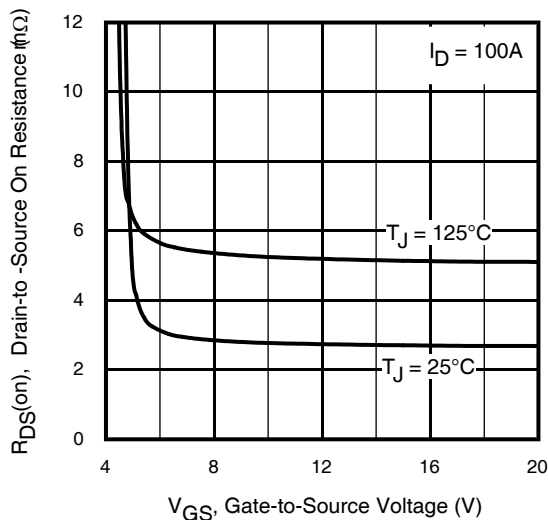
**Benefits**

- Improved Gate, Avalanche and Dynamic dV/dt Ruggedness
- Fully Characterized Capacitance and Avalanche SOA
- Enhanced body diode dV/dt and dI/dt Capability
- Lead-Free, RoHS Compliant

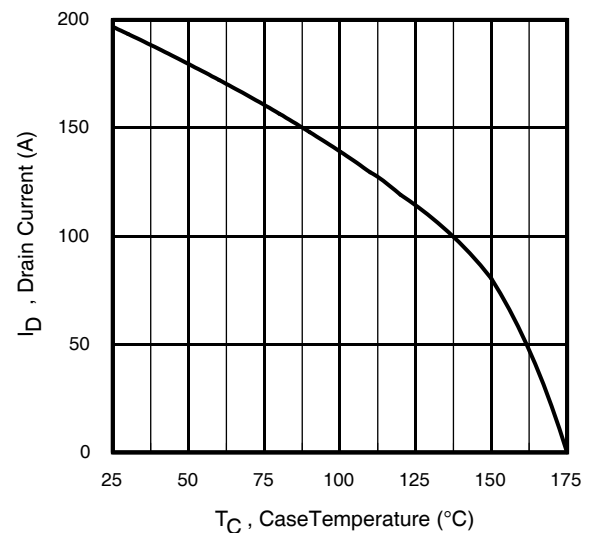


<b>G</b>	<b>D</b>	<b>S</b>
Gate	Drain	Source

Base Part Number	Package Type	Standard Pack		Complete Part Number
		Form	Quantity	
IRFS7734-7PPbF	D2Pak-7PIN	Tube	50	IRFS7734-7PPbF
		Tape and Reel Left	800	IRFS7734TRL7PP



**Fig 1.** Typical On-Resistance vs. Gate Voltage



**Fig 2.** Maximum Drain Current vs. Case Temperature

**Absolute Maximum Rating**

Symbol	Parameter	Max.	Units
$I_D @ T_C = 25^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	197	A
$I_D @ T_C = 100^\circ\text{C}$	Continuous Drain Current, $V_{GS} @ 10\text{V}$	139	
$I_{DM}$	Pulsed Drain Current ①	600	
$P_D @ T_C = 25^\circ\text{C}$	Maximum Power Dissipation	294	W
	Linear Derating Factor	2.0	W/°C
$V_{GS}$	Gate-to-Source Voltage	$\pm 20$	V
$T_J$ $T_{STG}$	Operating Junction and Storage Temperature Range	-55 to + 175	°C
	Soldering Temperature, for 10 seconds (1.6mm from case)	300	

**Avalanche Characteristics**

$E_{AS}$ (Thermally limited)	Single Pulse Avalanche Energy ②	350	mJ
$E_{AS}$ (Thermally limited)	Single Pulse Avalanche Energy ⑨	670	
$I_{AR}$	Avalanche Current ①	See Fig 14, 15, 23a, 23b	A
$E_{AR}$	Repetitive Avalanche Energy ①		mJ

**Thermal Resistance**

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑦	—	0.51	°C/W
$R_{\theta JA}$	Junction-to-Ambient ⑧	—	40	

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	75	—	—	V	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	53	—	mV/°C	Reference to $25^\circ\text{C}$ , $I_D = 1\text{mA}$ ①
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	2.6	3.05	mΩ	$V_{GS} = 10\text{V}, I_D = 100\text{A}$
		—	3.1	—	mΩ	$V_{GS} = 6.0\text{V}, I_D = 50\text{A}$
$V_{GS(th)}$	Gate Threshold Voltage	2.1	—	3.7	V	$V_{DS} = V_{GS}, I_D = 250\mu\text{A}$
$I_{DSS}$	Drain-to-Source Leakage Current	—	—	1.0	μA	$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}$
		—	—	150		$V_{DS} = 75\text{V}, V_{GS} = 0\text{V}, T_J = 125^\circ\text{C}$
$I_{GSS}$	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20\text{V}$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20\text{V}$
$R_G$	Gate Resistance	—	2.0	—	Ω	

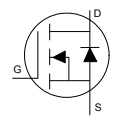
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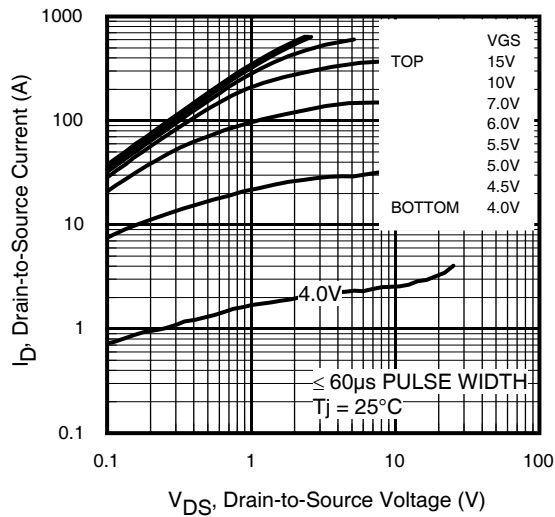
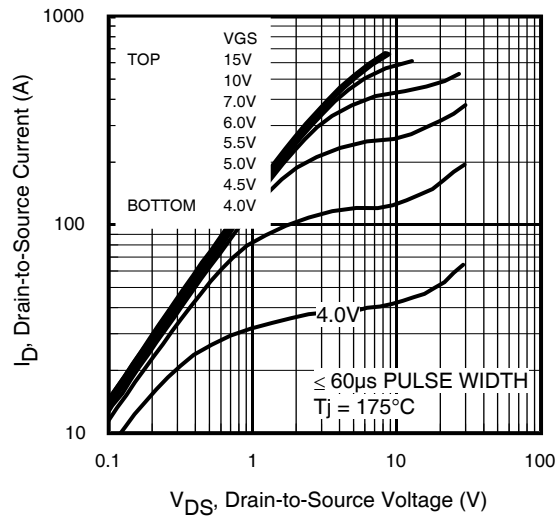
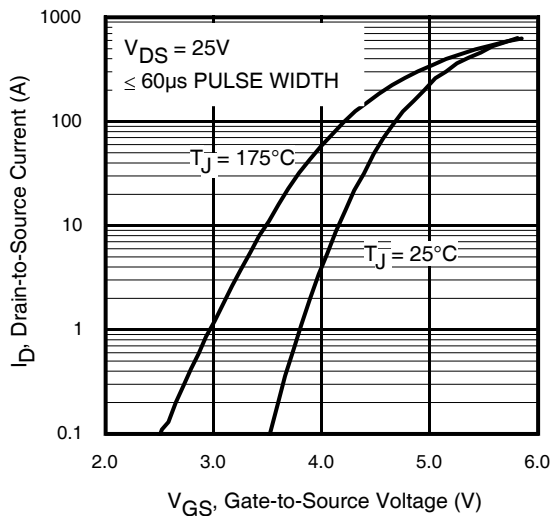
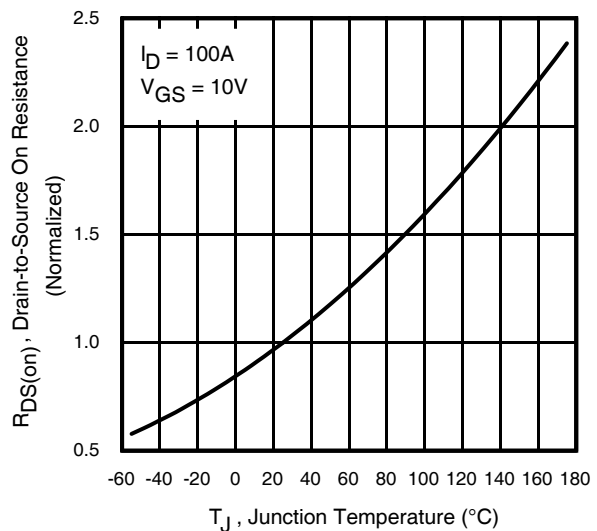
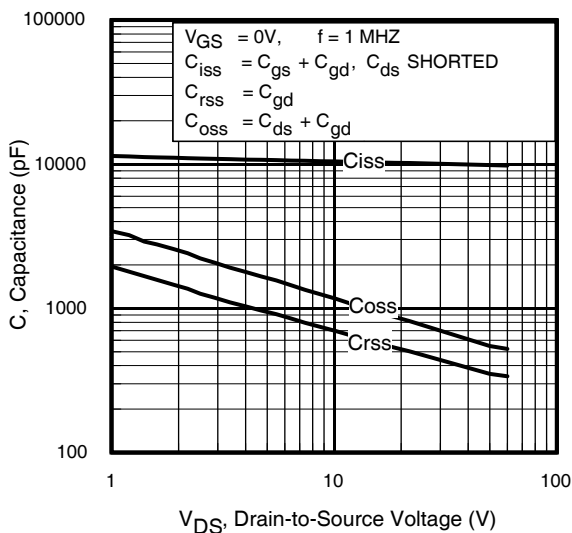
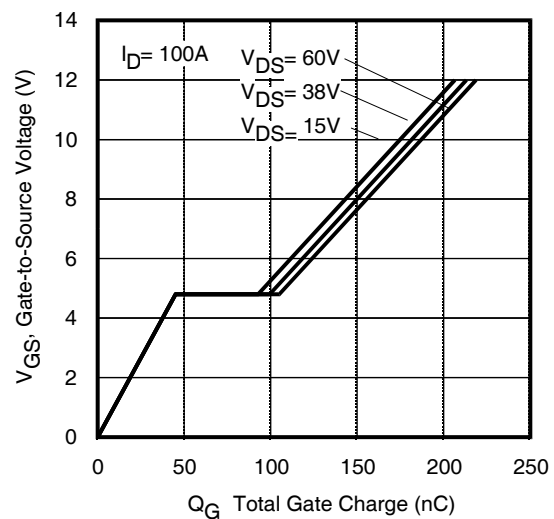
- ① Repetitive rating; pulse width limited by max. junction temperature.
- ② Limited by  $T_{Jmax}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 0.07\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 100\text{A}$ ,  $V_{GS} = 10\text{V}$ .
- ③  $I_{SD} \leq 100\text{A}$ ,  $di/dt \leq 1314\text{A}/\mu\text{s}$ ,  $V_{DD} \leq V_{(BR)DSS}$ ,  $T_J \leq 175^\circ\text{C}$ .
- ④ Pulse width  $\leq 400\mu\text{s}$ ; duty cycle  $\leq 2\%$ .
- ⑤  $C_{oss}$  eff. (TR) is a fixed capacitance that gives the same charging time as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑥  $C_{oss}$  eff. (ER) is a fixed capacitance that gives the same energy as  $C_{oss}$  while  $V_{DS}$  is rising from 0 to 80%  $V_{DSS}$ .
- ⑦  $R_\theta$  is measured at  $T_J$  approximately  $90^\circ\text{C}$ .
- ⑧ When mounted on 1" square PCB (FR-4 or G-10 Material). For recommended footprint and soldering techniques refer to application note #AN-994: <http://www.irf.com/technical-info/appnotes/an-994.pdf>
- ⑨ Limited by  $T_{Jmax}$ , starting  $T_J = 25^\circ\text{C}$ ,  $L = 1\text{mH}$ ,  $R_G = 50\Omega$ ,  $I_{AS} = 37\text{A}$ ,  $V_{GS} = 10\text{V}$ .

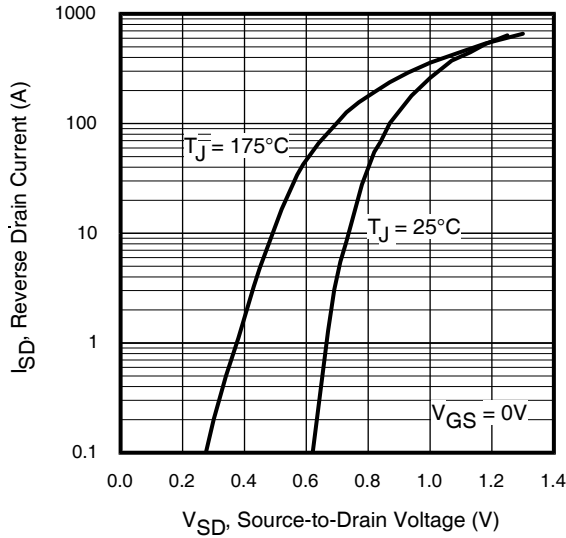
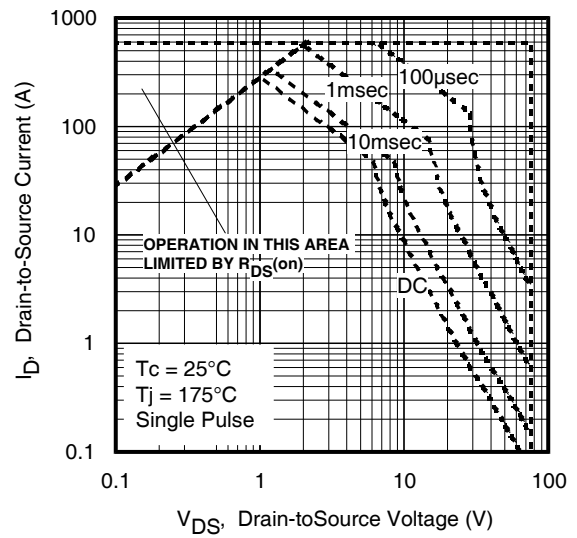
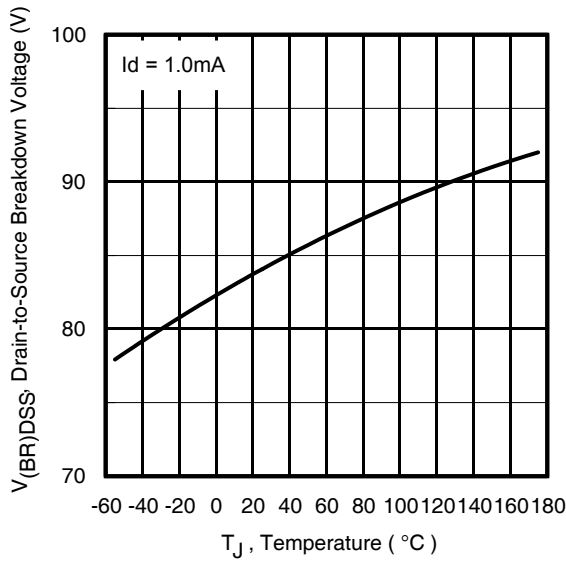
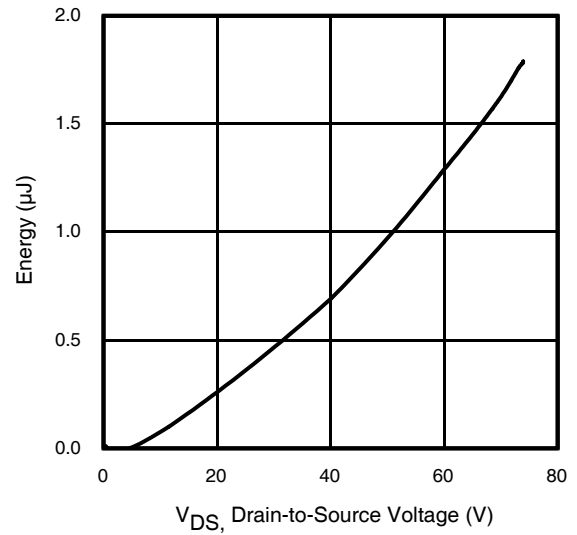
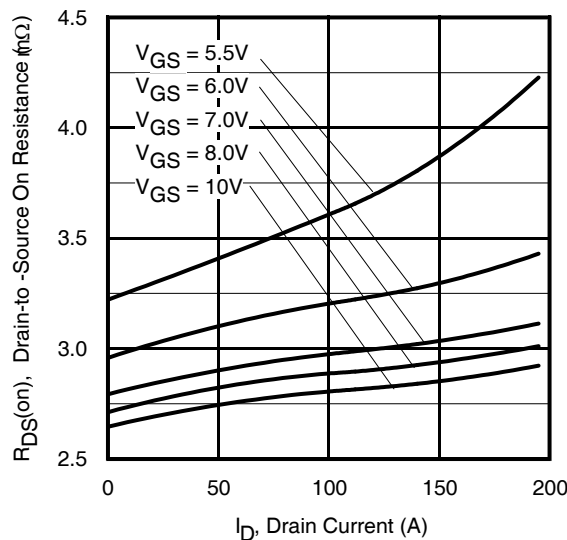
**Dynamic Electrical Characteristics @  $T_J = 25^\circ\text{C}$  (unless otherwise specified)**

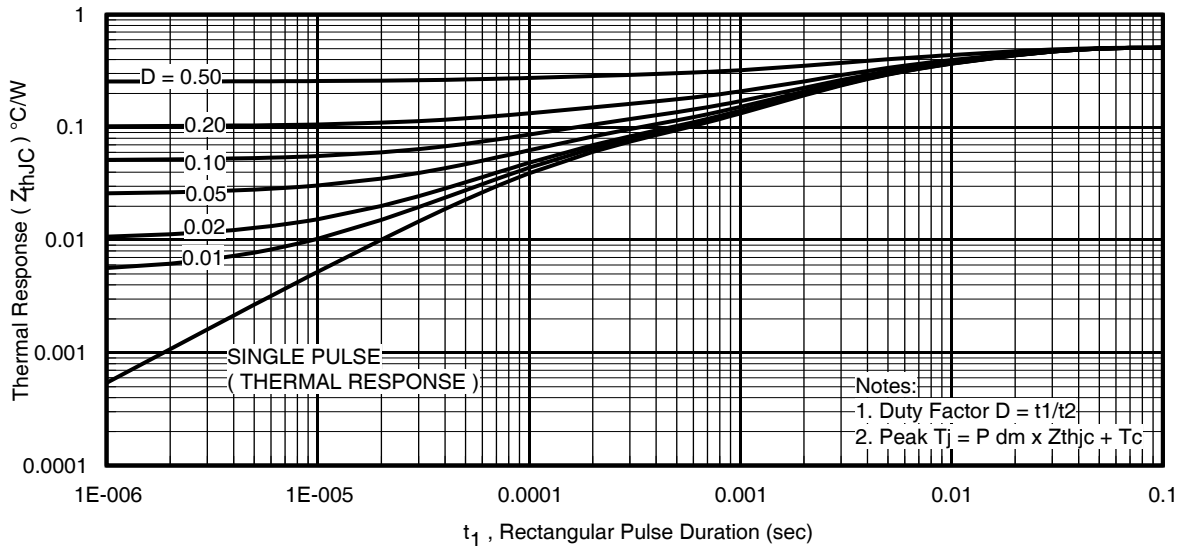
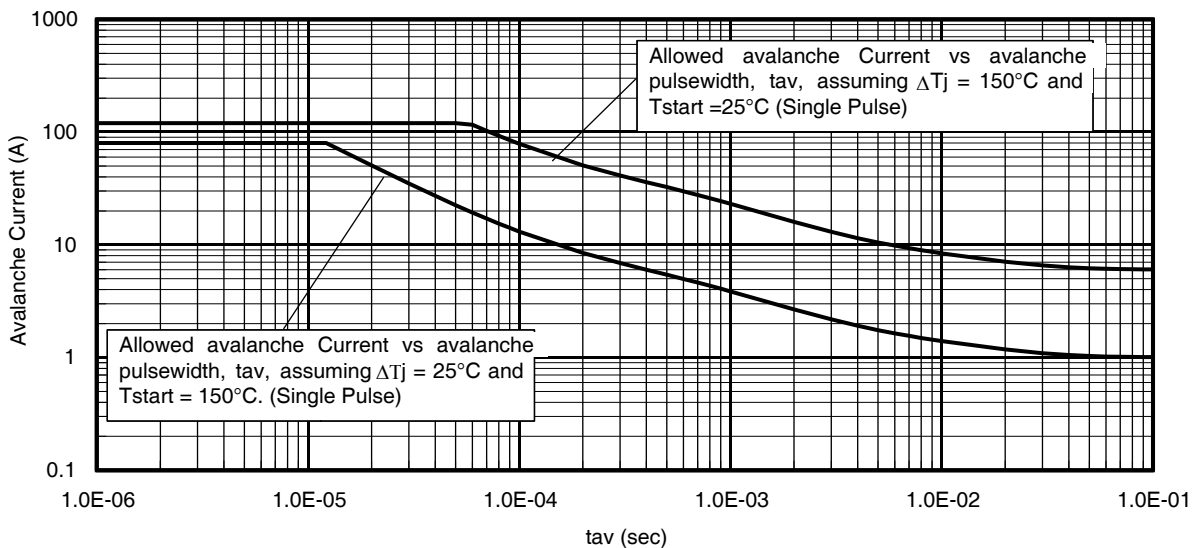
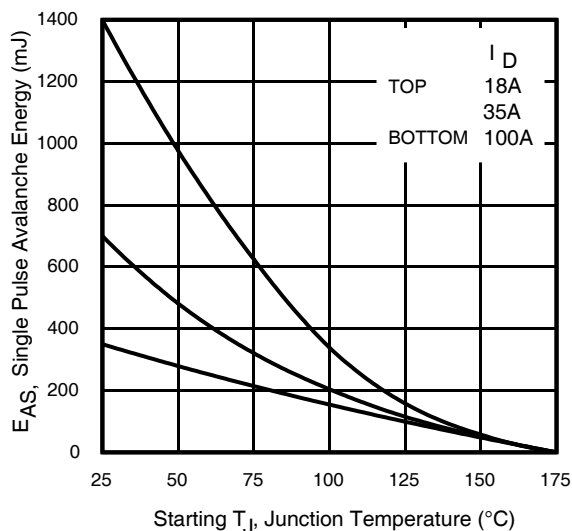
Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	182	—	—	S	$V_{DS} = 10\text{V}, I_D = 100\text{A}$
$Q_g$	Total Gate Charge	—	180	270	nC	$I_D = 100\text{A}$ $V_{DS} = 38\text{V}$ $V_{GS} = 10\text{V}$
$Q_{gs}$	Gate-to-Source Charge	—	45	—		
$Q_{gd}$	Gate-to-Drain Charge	—	54	—		
$Q_{sync}$	Total Gate Charge Sync. ( $Q_g - Q_{gd}$ )	—	126	—		
$t_{d(on)}$	Turn-On Delay Time	—	17	—	ns	$V_{DD} = 38\text{V}$ $I_D = 100\text{A}$ $R_G = 2.7\Omega$ $V_{GS} = 10\text{V}^{(4)}$
$t_r$	Rise Time	—	85	—		
$t_{d(off)}$	Turn-Off Delay Time	—	123	—		
$t_f$	Fall Time	—	75	—		
$C_{iss}$	Input Capacitance	—	10130	—	pF	$V_{GS} = 0\text{V}$ $V_{DS} = 25\text{V}$ $f = 1.0\text{MHz}$
$C_{oss}$	Output Capacitance	—	820	—		
$C_{riss}$	Reverse Transfer Capacitance	—	506	—		
$C_{oss\ eff.(ER)}$	Effective Output Capacitance (Energy Related)	—	715	—		
$C_{oss\ eff.(TR)}$	Output Capacitance (Time Related)	—	935	—		

**Diode Characteristics**

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$I_S$	Continuous Source Current (Body Diode) <sup>(1)</sup>	—	—	197	A	MOSFET symbol showing the integral reverse p-n junction diode. 
$I_{SM}$	Pulsed Source Current (Body Diode) <sup>(1)</sup>	—	—	600		
$V_{SD}$	Diode Forward Voltage	—	—	1.2	V	$T_J = 25^\circ\text{C}, I_S = 100\text{A}, V_{GS} = 0\text{V}^{(4)}$
dv/dt	Peak Diode Recovery dv/dt <sup>(3)</sup>	—	4.8	—	V/ns	$T_J = 175^\circ\text{C}, I_S = 100\text{A}, V_{DS} = 75\text{V}^{(3)}$
$t_{rr}$	Reverse Recovery Time	—	46	—	ns	$T_J = 25^\circ\text{C}$ $V_{DD} = 64\text{V}$ $T_J = 125^\circ\text{C}$ $I_F = 100\text{A},$
		—	51	—		
$Q_{rr}$	Reverse Recovery Charge	—	73	—	nC	$T_J = 25^\circ\text{C}$ $di/dt = 100\text{A}/\mu\text{s}^{(4)}$ $T_J = 125^\circ\text{C}$
		—	95	—		
$I_{RRM}$	Reverse Recovery Current	—	2.7	—	A	$T_J = 25^\circ\text{C}$


**Fig 3. Typical Output Characteristics**

**Fig 4. Typical Output Characteristics**

**Fig 5. Typical Transfer Characteristics**

**Fig 6. Normalized On-Resistance vs. Temperature**

**Fig 7. Typical Capacitance vs.**

**Fig 8. Typical Gate Charge vs. Gate-to-Source Voltage**


**Fig 9.** Typical Source-Drain Diode Forward Voltage

**Fig 10.** Maximum Safe Operating Area

**Fig 11.** Drain-to-Source Breakdown Voltage

**Fig 12.** Typical  $C_{oss}$  Stored Energy

**Fig 13.** Typical On-Resistance vs. Drain Current


**Fig 14. Maximum Effective Transient Thermal Impedance, Junction-to-Case**

**Fig 15. Avalanche Current vs. Pulse Width**

**Fig 16. Maximum Avalanche Energy vs. Temperature**
**Notes on Repetitive Avalanche Curves , Figures 14, 15:  
(For further info, see AN-1005 at www.irf.com)**

1. Avalanche failures assumption:  
Purely a thermal phenomenon and failure occurs at a temperature far in excess of  $T_{jmax}$ . This is validated for every part type.
2. Safe operation in Avalanche is allowed as long as  $T_{jmax}$  is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 23a, 23b.
4.  $P_{D(ave)}$  = Average power dissipation per single avalanche pulse.
5. BV = Rated breakdown voltage (1.3 factor accounts for voltage increase during avalanche).
6.  $I_{av}$  = Allowable avalanche current.
7.  $\Delta T$  = Allowable rise in junction temperature, not to exceed  $T_{jmax}$  (assumed as 25°C in Figure 14, 15).

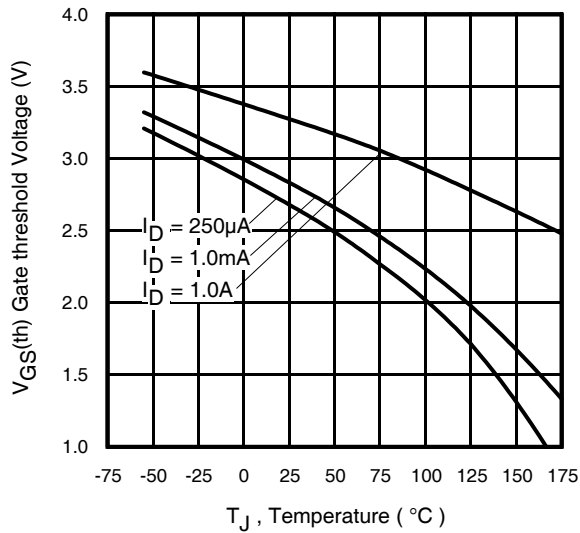
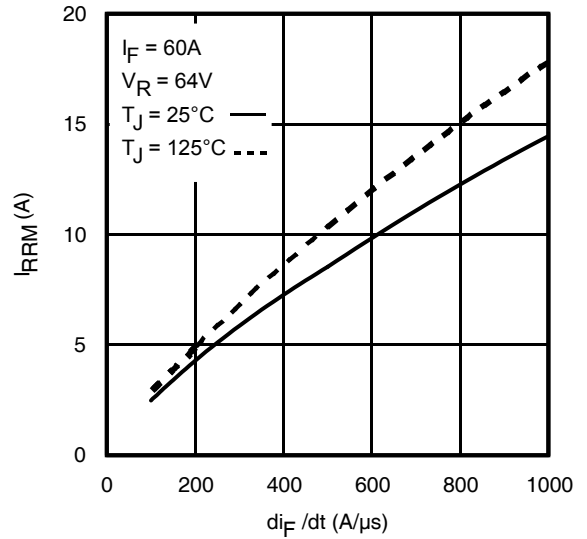
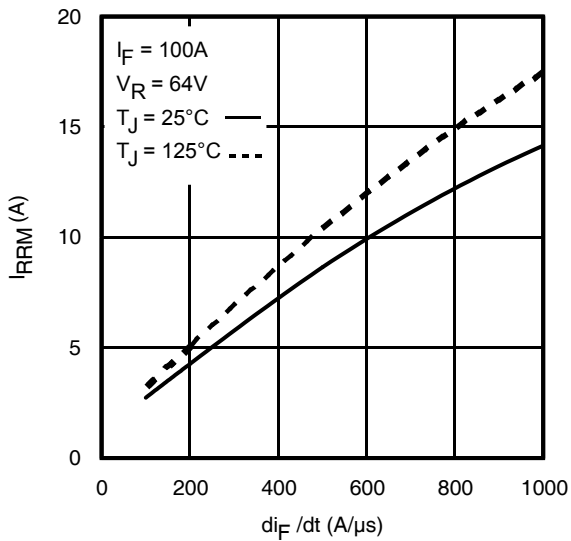
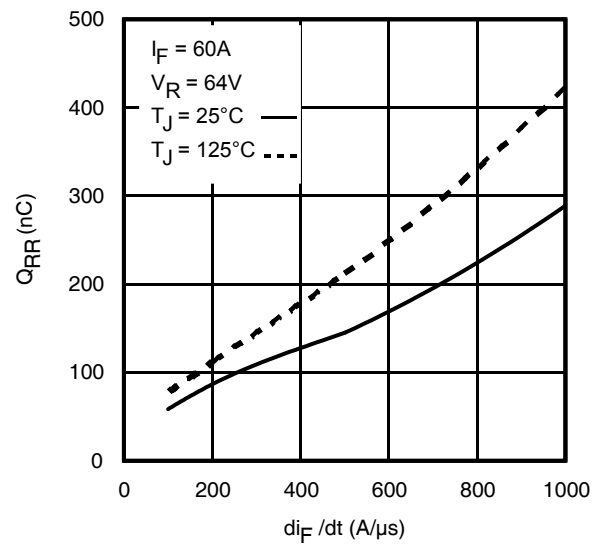
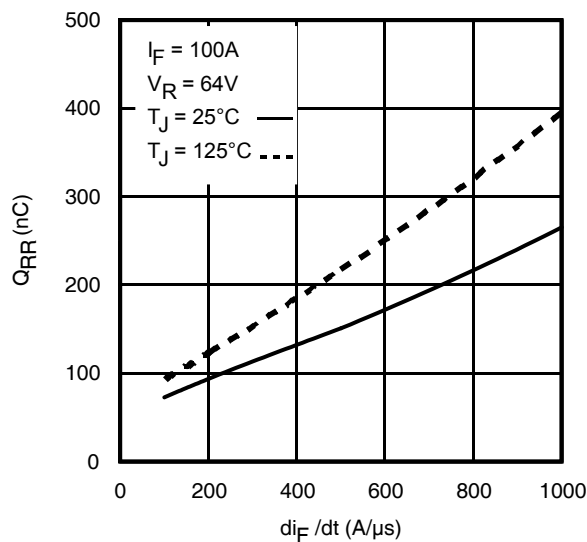
 $t_{av}$  = Average time in avalanche.

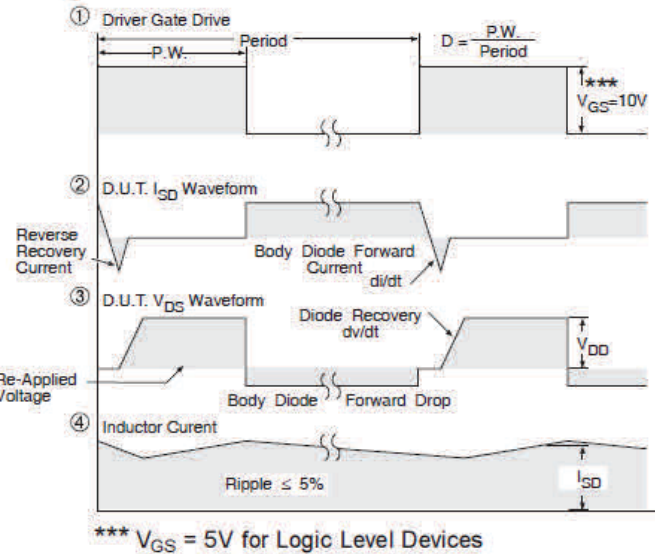
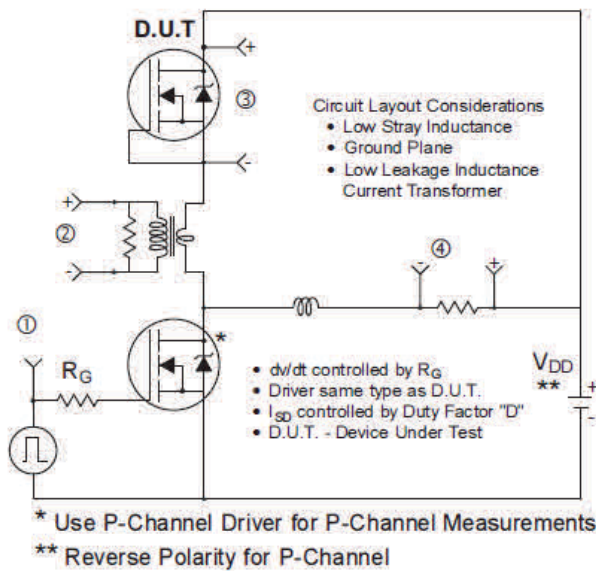
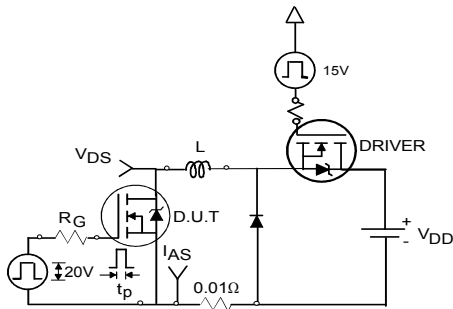
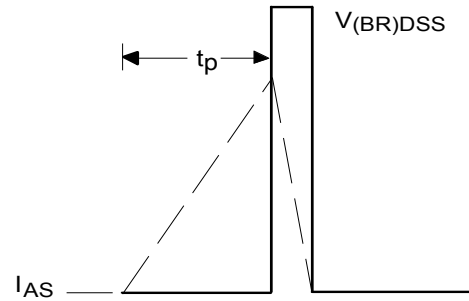
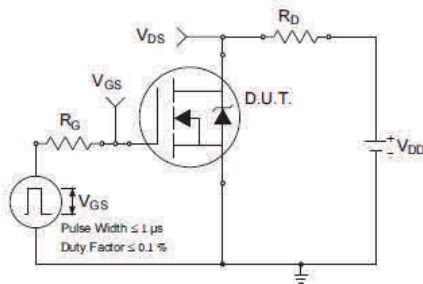
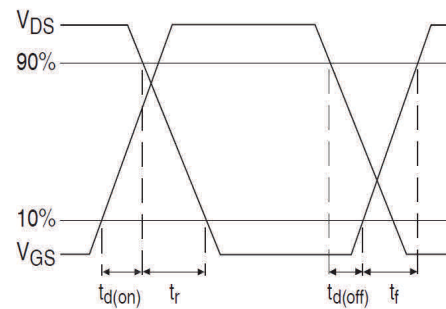
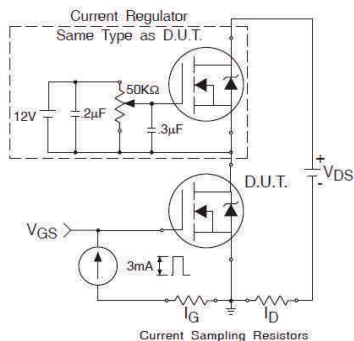
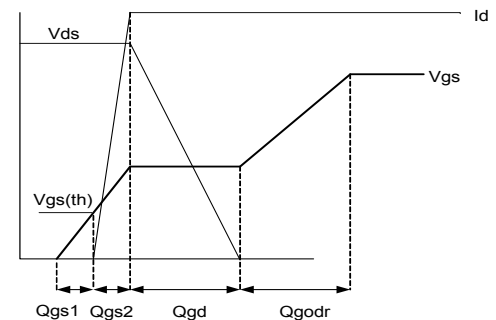
 $D$  = Duty cycle in avalanche =  $t_{av} \cdot f$ 
 $Z_{thJC}(D, t_{av})$  = Transient thermal resistance, see Figures 13)

$$P_{D(ave)} = 1/2 ( 1.3 \cdot BV \cdot I_{av} ) = \Delta T / Z_{thJC}$$

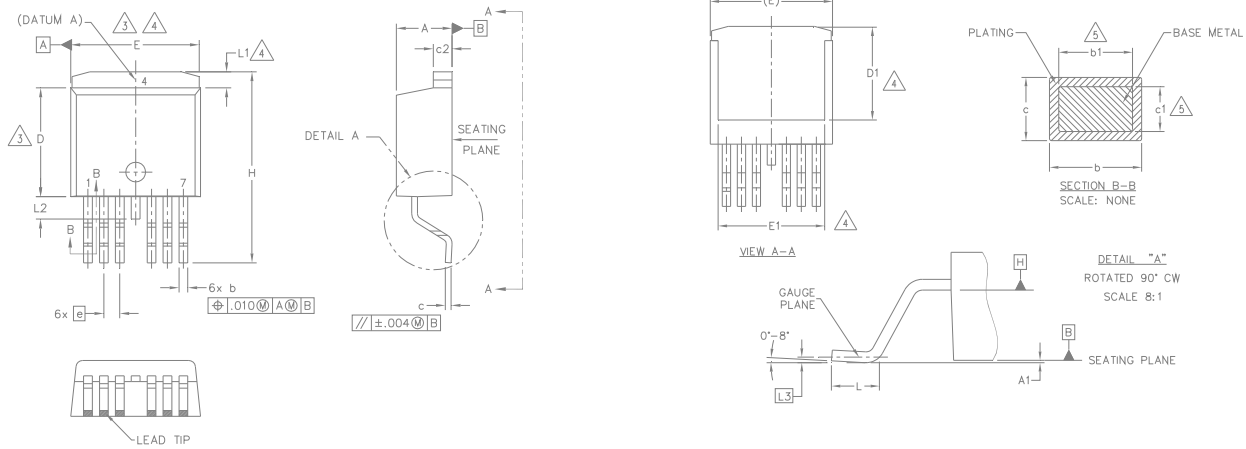
$$I_{av} = 2\Delta T / [ 1.3 \cdot BV \cdot Z_{th} ]$$

$$E_{AS(AR)} = P_{D(ave)} \cdot t_{av}$$


**Fig 17.** Threshold Voltage vs. Temperature

**Fig 18.** Typical Recovery Current vs. dif/dt

**Fig 19.** Typical Recovery Current vs. dif/dt

**Fig 20.** Typical Stored Charge vs. dif/dt

**Fig 21.** Typical Stored Charge vs. dif/dt


**Fig 22. Peak Diode Recovery  $dv/dt$  Test Circuit for N-Channel HEXFET® Power MOSFETs**

**Fig 23a. Unclamped Inductive Test Circuit**

**Fig 23b. Unclamped Inductive Waveforms**

**Fig 24a. Switching Time Test Circuit**

**Fig 24b. Switching Time Waveforms**

**Fig 25a. Gate Charge Test Circuit**

**Fig 25b. Gate Charge Waveform**



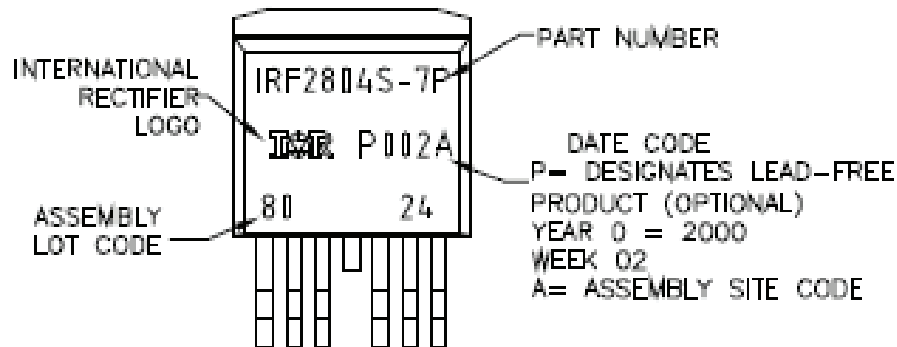
**D<sup>2</sup>Pak-7Pin Package Outline (Dimensions are shown in millimeters (inches))**


SYMBOL	DIMENSIONS				NOTES
	MILLIMETERS		INCHES		
	MIN.	MAX.	MIN.	MAX.	
A	4.06	4.83	.160	.190	
A1	—	0.254	—	.010	
b	0.51	0.99	.020	.036	
b1	0.51	0.89	.020	.032	5
c	0.38	0.74	.015	.029	
c1	0.38	0.58	.015	.023	5
c2	1.14	1.65	.045	.065	
D	8.38	9.65	.330	.380	3
D1	6.86	7.42	.270	.292	4
E	9.65	10.54	.380	.415	3,4
E1	6.22	8.48	.245	.334	4
e	1.27 BSC		.050 BSC		
H	14.61	15.88	.575	.625	
L	1.78	2.79	.070	.110	
L1	—	1.68	—	.066	4
L2	—	1.78	—	.070	
L3	0.25 BSC		.010 BSC		

**NOTES:**

1. DIMENSIONING AND TOLERANCING AS PER ASME Y14.5M-1994
2. DIMENSIONS ARE SHOWN IN MILLIMETERS [INCHES].
3. DIMENSION D & E DO NOT INCLUDE MOLD FLASH. MOLD FLASH SHALL NOT EXCEED 0.127 [.005"] PER SIDE. THESE DIMENSIONS ARE MEASURED AT THE OUTMOST EXTREMES OF THE PLASTIC BODY AT DATUM H.
4. THERMAL PAD CONTOUR OPTIONAL WITHIN DIMENSION E, L1, D1 & E1.
5. DIMENSION b1 AND c1 APPLY TO BASE METAL ONLY.
6. DATUM A & B TO BE DETERMINED AT DATUM PLANE H.
7. CONTROLLING DIMENSION: INCH.
8. OUTLINE CONFORMS TO JEDEC OUTLINE TO-263CB. EXCEPT FOR DIMS. E, E1 & D1.

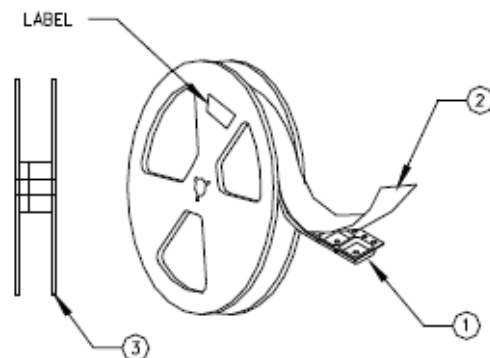
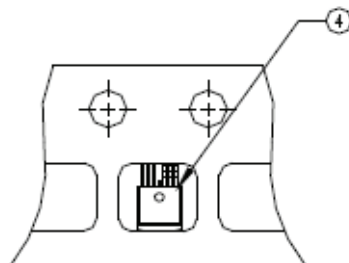
Note: For the most current drawing please refer to IR website at <http://www.irf.com/package/>

**D<sup>2</sup>Pak-7Pin Part Marking Information**

**D2Pak-7Pin Tape and Reel**
**NOTES, TAPE & REEL, LABELLING:**
**1. TAPE AND REEL**

- 1.1 REEL SIZE 13 INCH DIAMETER.
- 1.2 EACH REEL CONTAINING 800 DEVICES.
- 1.3 THERE SHALL BE A MINIMUM OF 42 SEALED POCKETS CONTAINED IN THE LEADER AND A MINIMUM OF 15 SEALED POCKETS IN THE TRAILER.
- 1.4 PEEL STRENGTH MUST CONFORM TO THE SPEC. NO. 71-9667.
- 1.5 PART ORIENTATION SHALL BE AS SHOWN BELOW.
- 1.6 REEL MAY CONTAIN A MAXIMUM OF TWO UNIQUE LOT CODE/DATE CODE COMBINATIONS. REWORKED REELS MAY CONTAIN A MAXIMUM OF THREE UNIQUE LOT CODE/DATE CODE COMBINATIONS. HOWEVER, THE LOT CODES AND DATE CODES WITH THEIR RESPECTIVE QUANTITIES SHALL APPEAR ON THE BAR CODE LABEL FOR THE AFFECTED REEL.

**2. LABELLING (REEL AND SHIPPING BAG).**

- 2.1 CUST. PART NUMBER (BAR CODE): IRFXXXXSTRL-7P
- 2.2 CUST. PART NUMBER (TEXT CODE): IRFXXXXSTRL-7P
- 2.3 I.R. PART NUMBER: IRFXXXXSTRL-7P
- 2.4 QUANTITY:
- 2.5 VENDOR CODE: IR
- 2.6 LOT CODE:
- 2.7 DATE CODE:



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

**Qualification Information<sup>†</sup>**

<b>Qualification Level</b>	Industrial (per JEDEC JESD47F) <sup>††</sup>	
<b>Moisture Sensitivity Level</b>	D <sup>2</sup> Pak-7Pin	MSL1 (per JEDEC J-STD-020D <sup>††</sup> )
<b>RoHS Compliant</b>	Yes	

† Qualification standards can be found at International Rectifier's web site: <http://www.irf.com/product-info/reliability/>

**Revision History**

<b>Date</b>	<b>Comment</b>
03/05/2015	<ul style="list-style-type: none"> <li>• Updated <math>E_{AS(L=1mH)} = 670mJ</math> on page 2</li> <li>• Updated note 9 "Limited by <math>T_{Jmax}</math>, starting <math>T_J = 25^{\circ}C</math>, <math>L = 1mH</math>, <math>R_G = 50\Omega</math>, <math>I_{AS} = 37A</math>, <math>V_{GS} = 10V</math>" on page 2</li> <li>• Updated package outline on page 9 .</li> </ul>
04/07/2015	<ul style="list-style-type: none"> <li>• Updated typo on Crss from "75pF" to "506pF" on page 3 .</li> </ul>