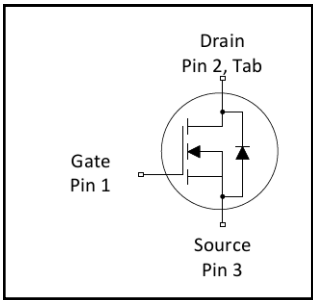
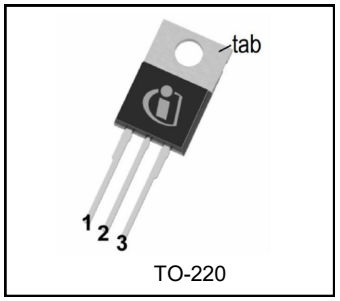
$V_{(BR)DSS}$	40V
$R_{DS(on)}$ typ.	2.0mΩ
max.	2.5mΩ
$I_{D\ (Silicon\ Limited)}$	172A①
$I_{D\ (Package\ Limited)}$	120A





G	D	S
Gate	Drain	Source

Applications

- 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
- DC/DC and AC/DC converters
- DC/AC Inverters

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, Halogen-Free*

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFB7440PbF	TO-220	Tube	50	IRFB7440PbF

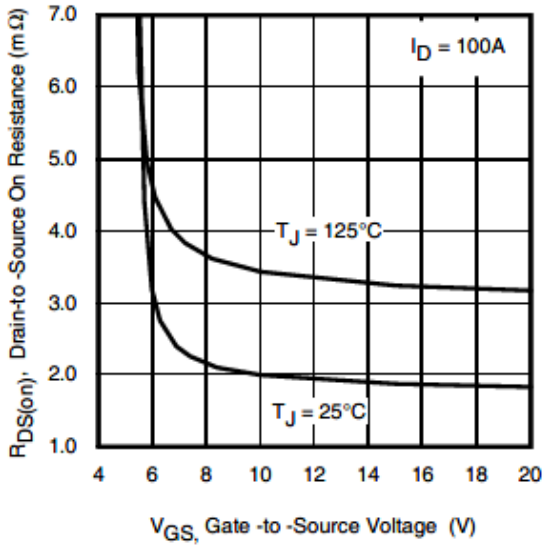


Fig 1. Typical On-Resistance vs. Gate Voltage

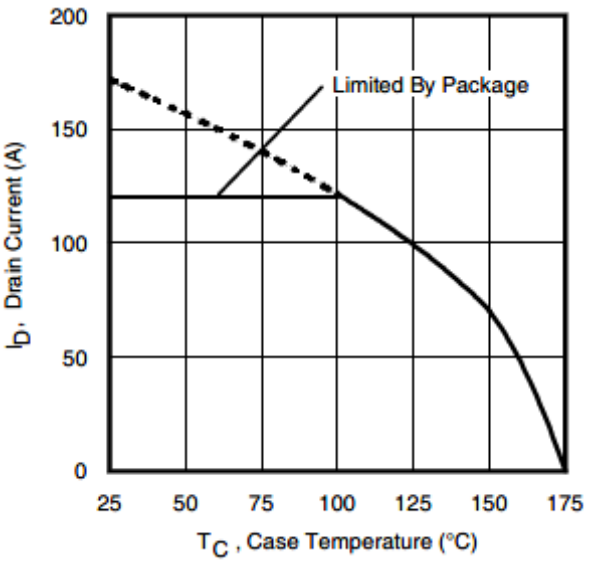


Fig 2. Maximum Drain Current vs. Case Temperature

Absolute Maximum Rating

Symbol	Parameter	Max.	Units
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	172①	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	122①	
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V (Wire Bond Limited)	120	
I_{DM}	Pulsed Drain Current ②	772	
P_D @ T_C = 25°C	Maximum Power Dissipation	143	W
	Linear Derating Factor	0.95	W/°C
V_{GS}	Gate-to-Source Voltage	± 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	
	Mounting torque, 6-32 or M3 screw	10lbf.in (1.1N.m)	

Avalanche Characteristics

Symbol	Parameter	Max.	Units
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy ③	161	mJ
$E_{AS\ (Thermally\ limited)}$	Single Pulse Avalanche Energy ⑨	387	
I_{AR}	Avalanche Current ②	See Fig 15, 16, 22a, 22b	A
E_{AR}	Repetitive Avalanche Energy ②		mJ

Thermal Resistance

	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ⑧	–––	1.05	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat Greased Surface	0.50	–––	
$R_{\theta JA}$	Junction-to-Ambient	–––	62	

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

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	40	–––	–––	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	–––	0.035	–––	mV/°C	Reference to 25°C, I_D = 5.0mA②
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	–––	2.0	2.5	mΩ	V_{GS} = 10V, I_D = 100A⑤
		–––	3.0	–––		V_{GS} = 6.0V, I_D = 50A ⑤
$V_{GS(th)}$	Gate Threshold Voltage	2.2	3.0	3.9	V	V_{DS} = V_{GS}, I_D = 100µA
I_{DSS}	Drain-to-Source Leakage Current	–––	–––	1.0	µA	V_{DS} = 40V, V_{GS} = 0V
		–––	–––	150		V_{DS} = 40V,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
R_G	Gate Resistance	–––	2.6	–––	Ω	

Notes:

① Calculated continuous current based on maximum allowable junction temperature. Bond wire current limit is 120A. Note that current limitations arising from heating of the device leads may occur with some lead mounting arrangements. (Refer to AN-1140)

② Repetitive rating; pulse width limited by max. junction temperature.

③ Limited by T_{Jmax}, starting T_J = 25°C, L = 0.032mH, R_G = 50Ω, I_{AS} = 100A, V_{GS} = 10V.

④ I_{SD} ≤ 100A, di/dt ≤ 1330A/µs, V_{DD} ≤ $V_{(BR)DSS}$, T_J ≤ 175°C.

⑤ Pulse width ≤ 400µs; duty cycle ≤ 2%.

⑥ 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}.

⑦ 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}.

⑧ R_θ is measured at T_J approximately 90°C.

⑨ Limited by T_{Jmax}, starting T_J = 25°C, L = 1mH, R_G = 50Ω, I_{AS} = 28A, V_{GS} =10V.

* Halogen-Free since April 30, 2014

Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
gfs	Forward Transconductance	88	—	—	S	V_{DS} = 10V, I_D = 100A
Q_g	Total Gate Charge	—	90	135	nC	I_D = 100A
Q_{gs}	Gate-to-Source Charge	—	23	—		V_{DS} = 20V
Q_{gd}	Gate-to-Drain Charge	—	32	—		V_{GS} = 10V ⑤
Q_{sync}	Total Gate Charge Sync. (Qg - Qgd)	—	58	—		
$t_{d(on)}$	Turn-On Delay Time	—	24	—	ns	V_{DD} = 20V
t_r	Rise Time	—	68	—		I_D = 30A
$t_{d(off)}$	Turn-Off Delay Time	—	115	—		R_G = 2.7Ω
t_f	Fall Time	—	68	—		V_{GS} = 10V ⑤
C_{iss}	Input Capacitance	—	4730	—	pF	V_{GS} = 0V
C_{oss}	Output Capacitance	—	680	—		V_{DS} = 25V
C_{rss}	Reverse Transfer Capacitance	—	460	—		f = 1.0MHz
$C_{oss\ eff.(ER)}$	Effective Output Capacitance (Energy Related)	—	845	—		V_{GS} = 0V, V_{DS} = 0V to 32V⑦
$C_{oss\ eff.(TR)}$	Output Capacitance (Time Related)	—	980	—		V_{GS} = 0V, V_{DS} = 0V to 32V⑥

Diode Characteristics

Symbol	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	172	A	MOSFET symbol showing the integral reverse p-n junction diode.
I_{SM}	Pulsed Source Current (Body Diode) ②	—	—	772		
V_{SD}	Diode Forward Voltage	—	0.9	1.3	V	T_J = 25°C, I_S = 100A, V_{GS} = 0V ⑤
dv/dt	Peak Diode Recovery ④	—	6.8	—	V/ns	T_J = 175°C, I_S = 100A, V_{DS} = 40V
t_{rr}	Reverse Recovery Time	—	24	—	ns	T_J = 25°C V_{DD} = 34V
		—	28	—		T_J = 125°C I_F = 100A,
Q_{rr}	Reverse Recovery Charge	—	17	—	nC	T_J = 25°C di/dt = 100A/µs ⑤
		—	20	—		T_J = 125°C
I_{RRM}	Reverse Recovery Current	—	1.3	—	A	T_J = 25°C

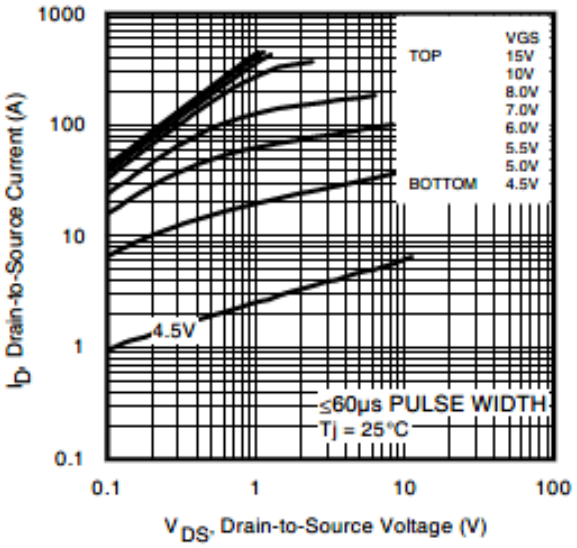


Fig 3. Typical Output Characteristics

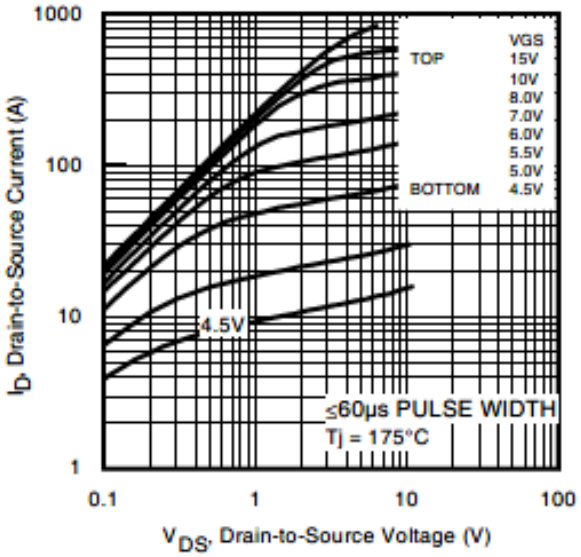


Fig 4. Typical Output Characteristics

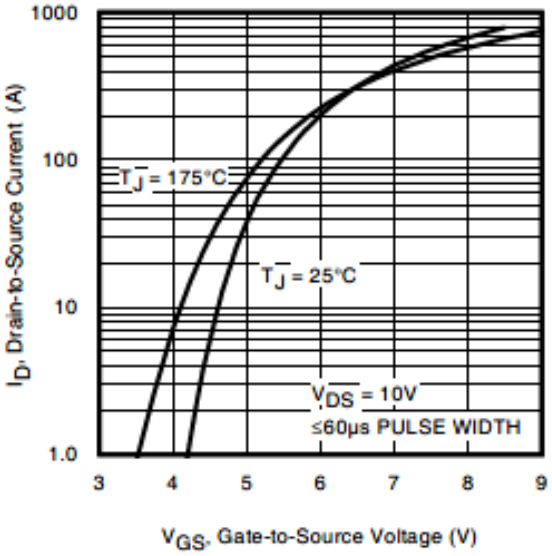


Fig 5. Typical Transfer Characteristics

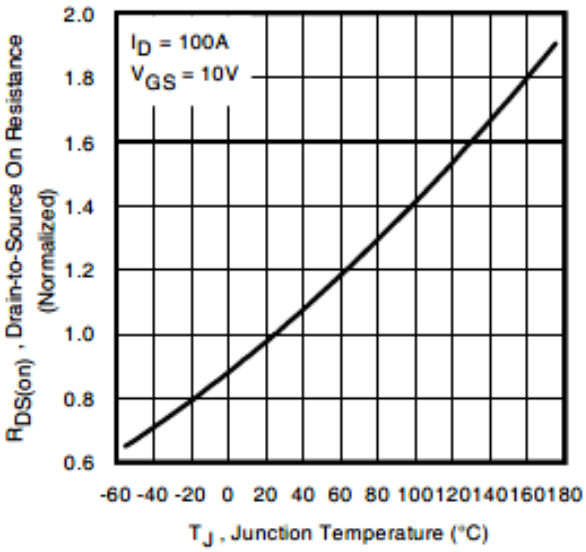


Fig 6. Normalized On-Resistance vs. Temperature

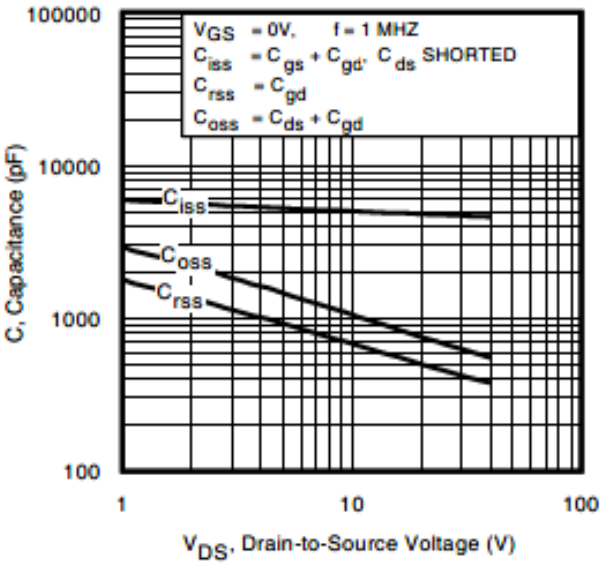


Fig 7. Typical Capacitance vs. Drain-to-Source Voltage

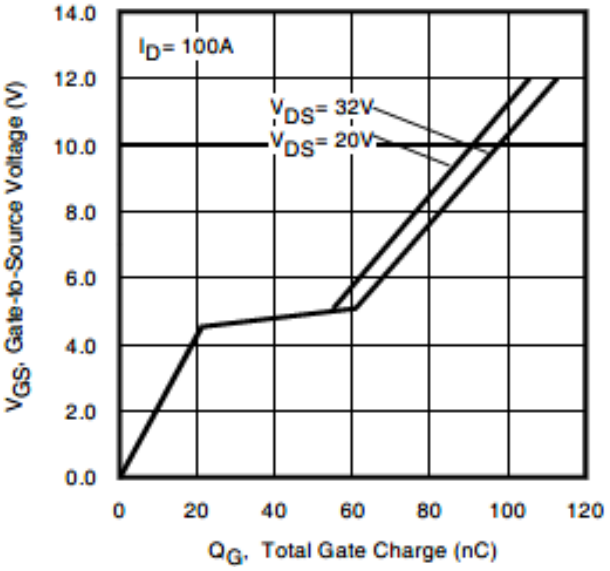


Fig 8. Typical Gate Charge vs. Gate-to-Source Voltage

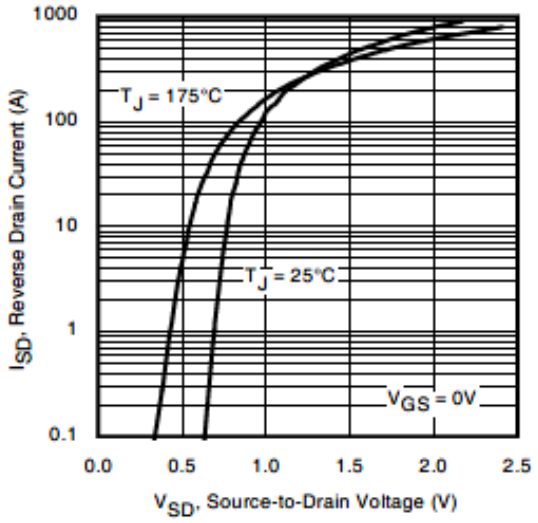


Fig 9. Typical Source-Drain Diode Forward Voltage

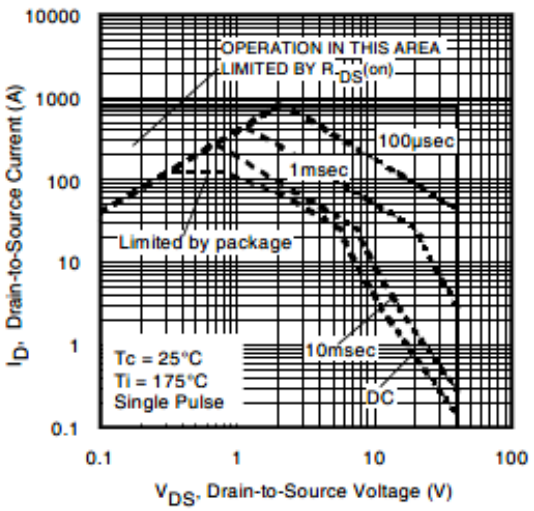


Fig 10. Maximum Safe Operating Area

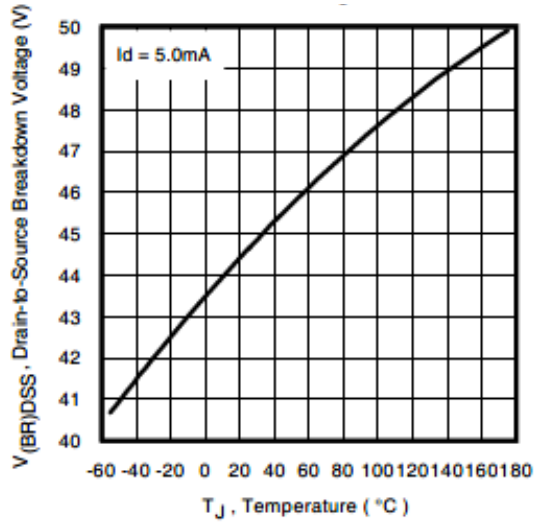


Fig 11. Drain-to-Source Breakdown Voltage

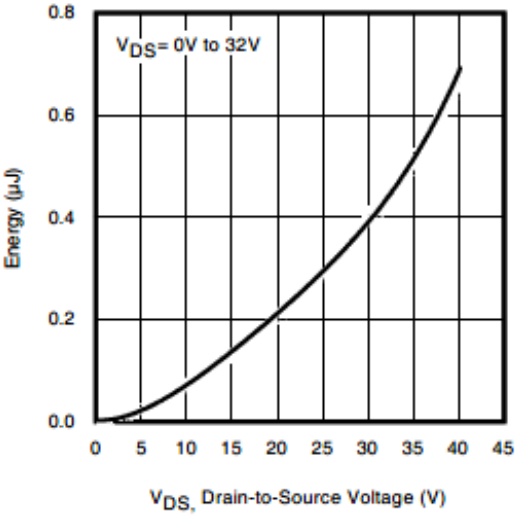


Fig 12. Typical C_{oss} Stored Energy

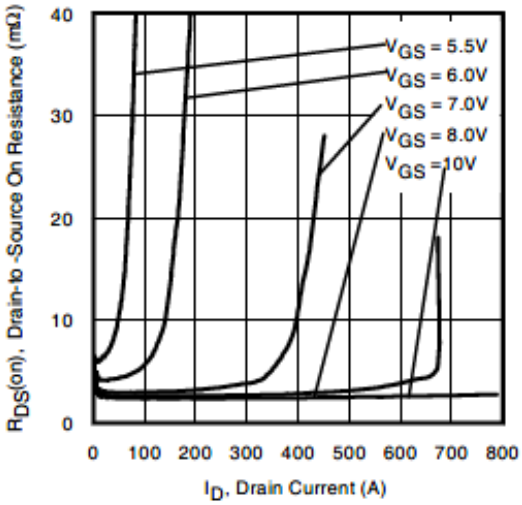


Fig 13. Typical On-Resistance vs. Drain Current

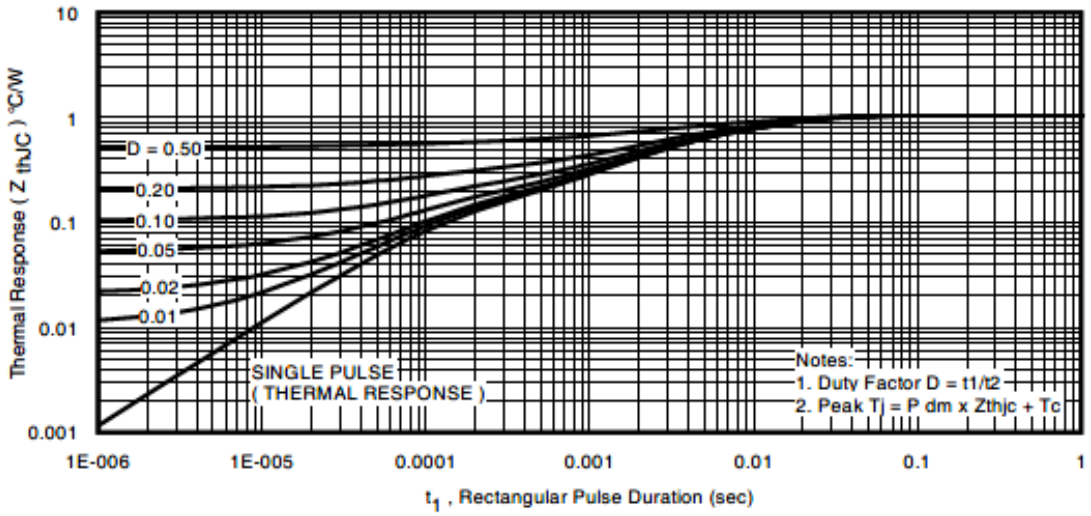


Fig 14. Maximum Effective Transient Thermal Impedance, Junction-to-Case

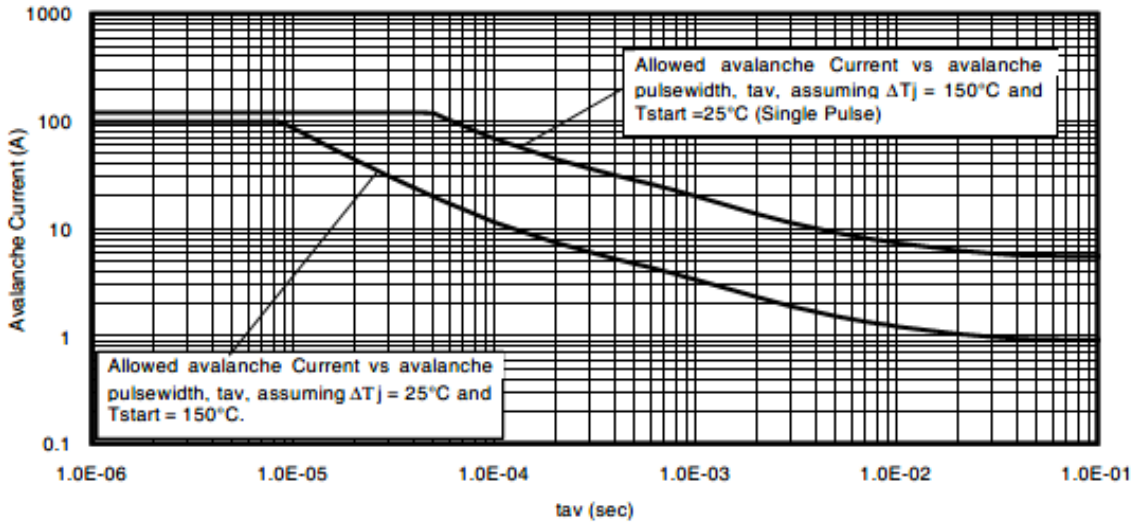


Fig 15. Typical Avalanche Current vs. Pulse Width

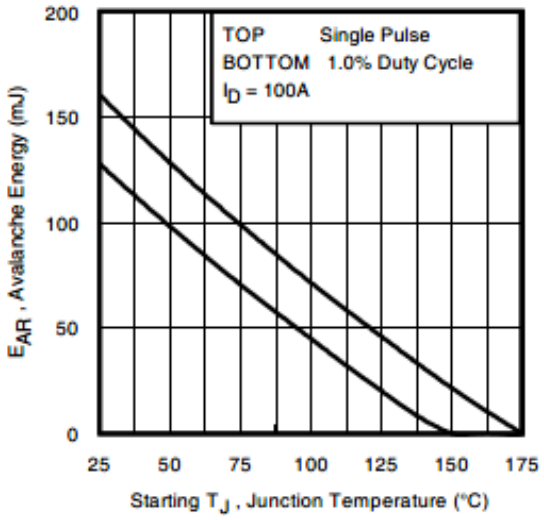


Fig 16. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 15, 16:
(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 asT_{jmax} is not exceeded.
3. Equation below based on circuit and waveforms shown in Figures 22a, 22b.
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. ΔT = Allowable rise in junction temperature, not to exceed T_{jmax} (assumed as 25°C in Figure 14, 16).
   t_{av} = Average time in avalanche.
   D = Duty cycle in avalanche = tav ·f
   $Z_{thJC}(D, t_{av})$ = Transient thermal resistance, see Figures 13)
   PD (ave) = 1/2 ($1.3 \cdot BV \cdot I_{av}$) = $\Delta T / Z_{thJC}$
   $I_{av} = 2\Delta T / [1.3 \cdot BV \cdot Z_{th}]$
   $E_{AS\ (AR)} = P_{D\ (ave)} \cdot t_{av}$

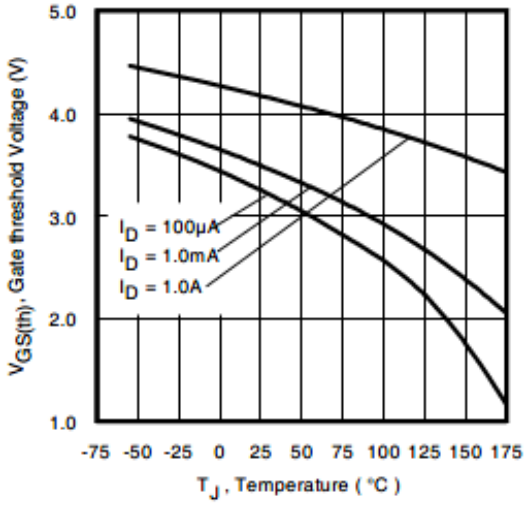


Fig 17. Threshold Voltage vs. Temperature

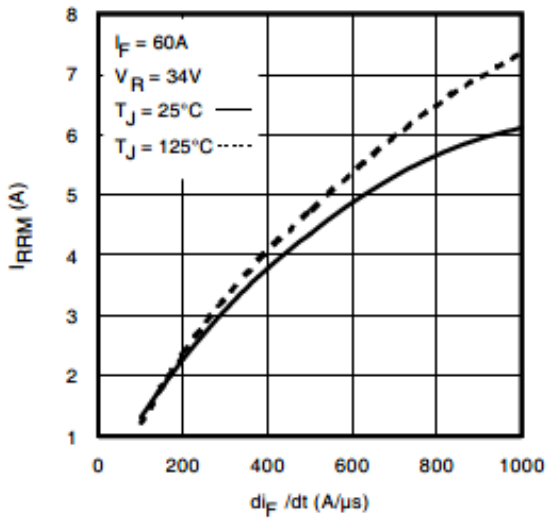


Fig 18. Typical Recovery Current vs. dif/dt

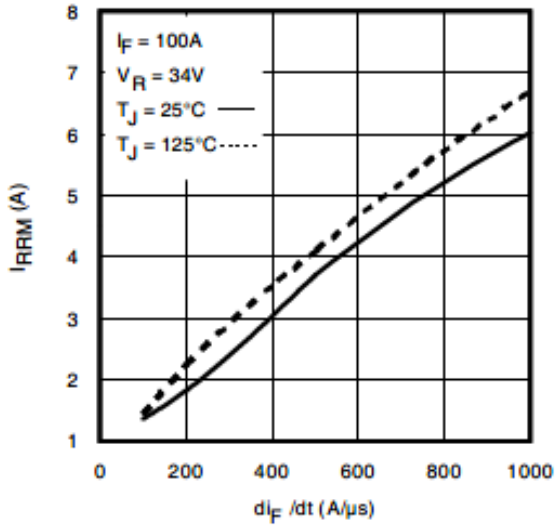


Fig 19. Typical Recovery Current vs. dif/dt

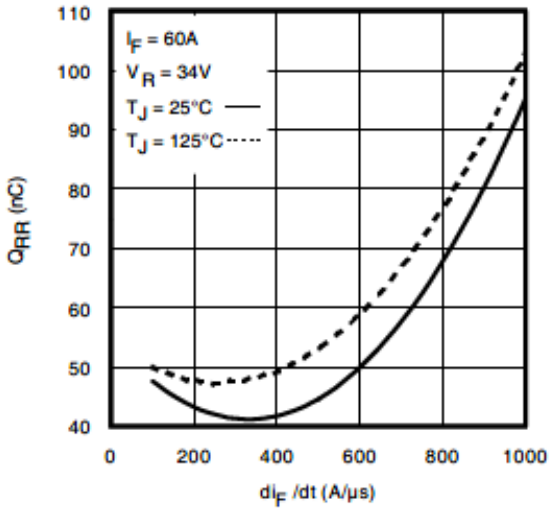


Fig 20. Typical Stored Charge vs. dif/dt

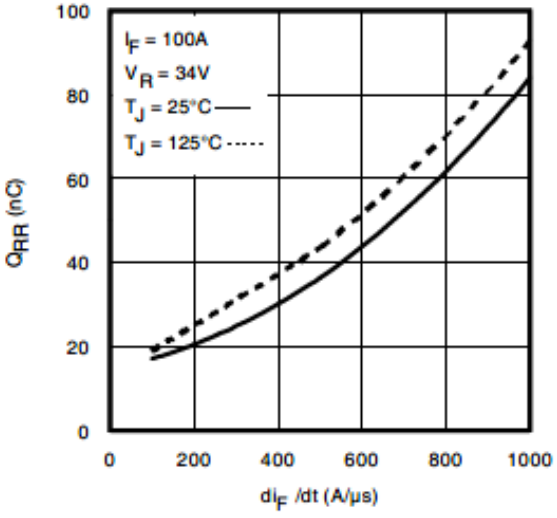


Fig 21. Typical Stored Charge vs. dif/dt

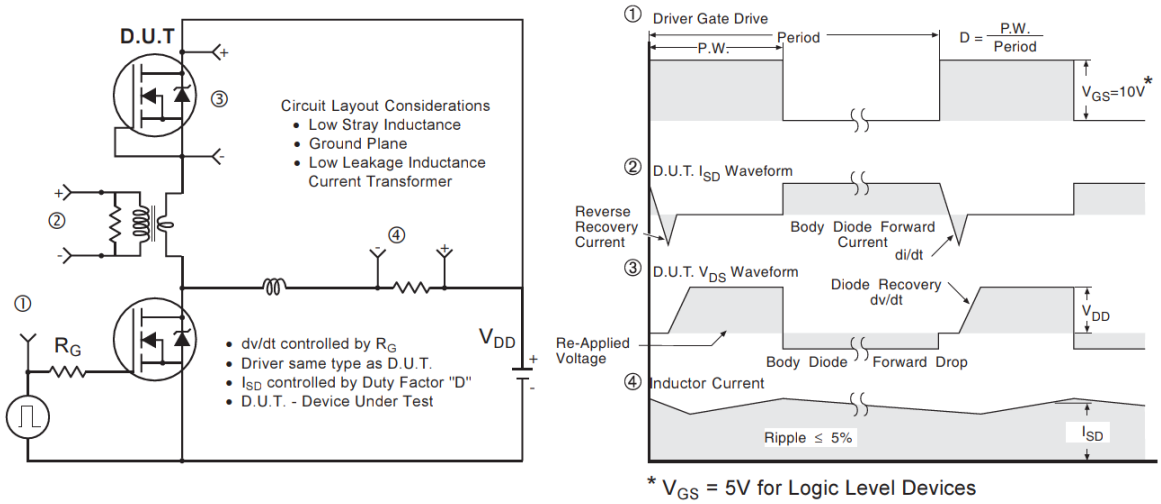


Fig 22. Peak Diode Recovery dv/dt Test Circuit for N-Channel HEXFET® Power MOSFETs

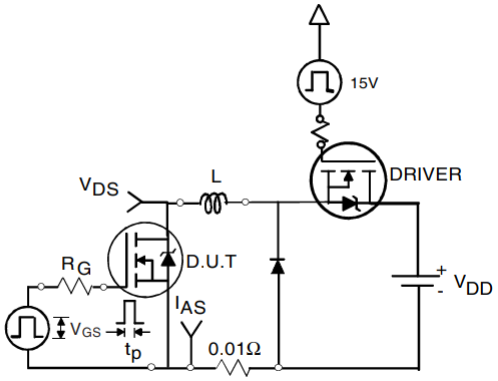


Fig 23a. Unclamped Inductive Test Circuit

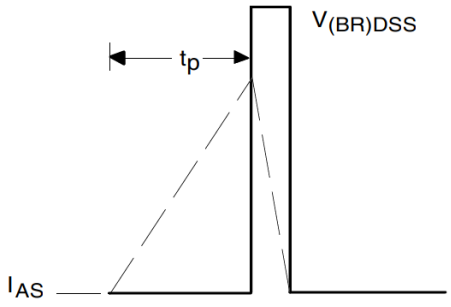


Fig 23b. Unclamped Inductive Waveforms

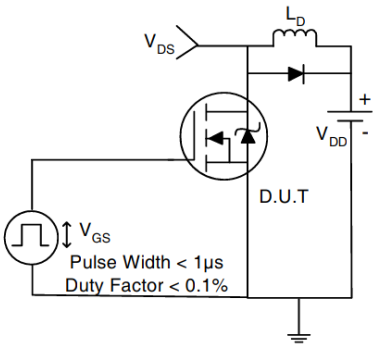


Fig 24a. Switching Time Test Circuit

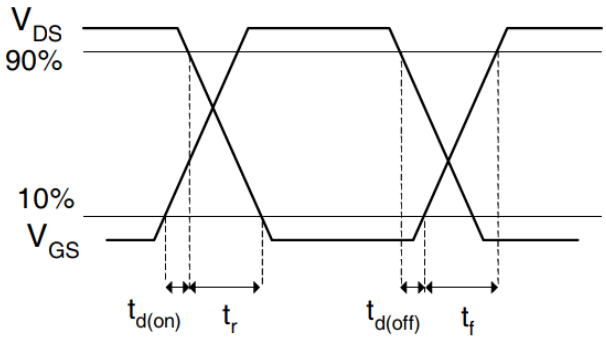


Fig 24b. Switching Time Waveforms

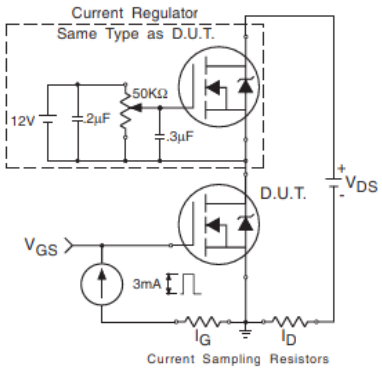


Fig 25a. Gate Charge Test Circuit

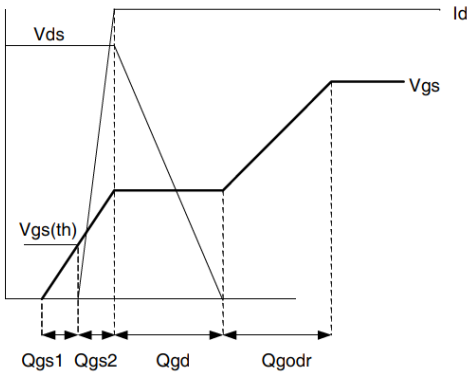
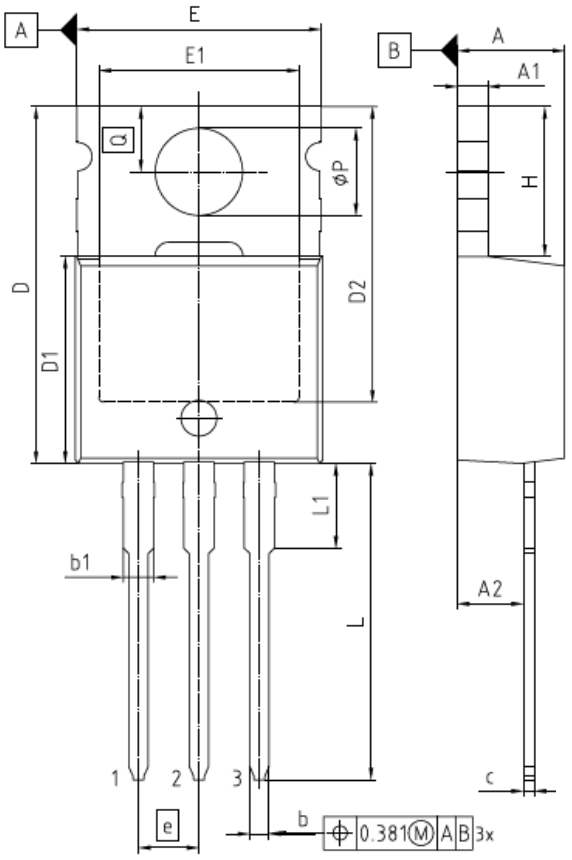


Fig 25b. Gate Charge Waveform

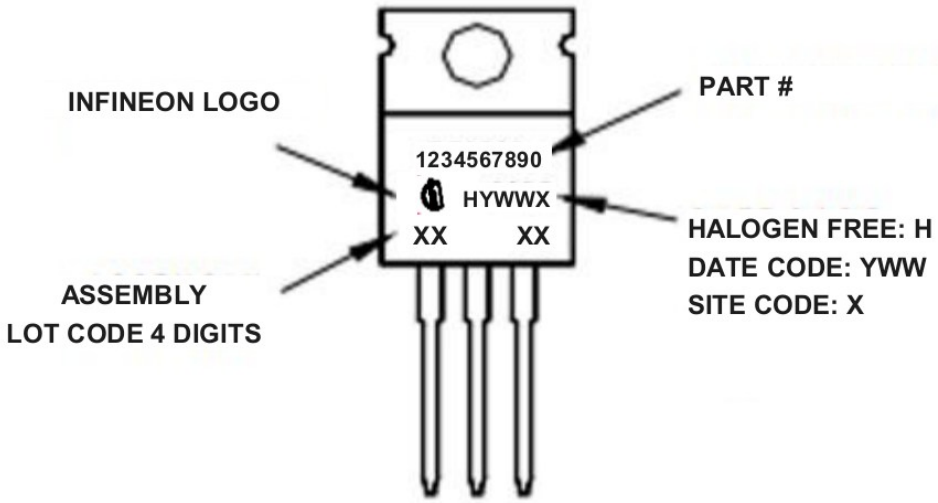
TO-220 Package Outline (Dimensions are shown in millimeters (inches))



NOTES:
DIMENSIONS DO NOT INCLUDE MOLD FLASH, PROTRUSION OR GATE BURRS
GATE BURRS ARE LESS THAN 0.5 mm

PACKAGE - GROUP NUMBER:	PG-TO220-3-U05	
DIMENSIONS	MILLIMETERS	
	MIN.	MAX.
A	3.56	4.83
A1	1.14	1.40
A2	2.03	2.92
b	0.38	1.01
b1	1.14	1.78
c	0.36	0.61
D	14.22	16.51
D1	8.38	9.20
D2	11.68	12.88
E	9.65	10.67
E1	6.86	8.89
e	2.54	
N	3	
H	5.84	6.86
L	12.70	14.73
L1	3.56	4.06
øP	3.54	4.08
Q	2.54	3.42

TO-220 Part Marking Information



TO-220 packages are not recommended for Surface Mount Application.

Qualification Information†

Qualification Level	Industrial (per JEDEC JESD47F) ††	
Moisture Sensitivity Level	TO-220	N/A
RoHS Compliant	Yes	

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

†† Applicable version of JEDEC standard at the time of product release.

Revision History

Date	Rev.	Comments
2026-09-16	2.1	• Update datasheet to Infineon format • Updated Package Outline and Part marking –page 8 • Added disclaimer on last page.

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Subject to the development and release of the product for series supply by Infineon, the technical specifications of the product are set forth in the relevant final product data sheet provided by Infineon.

Infineon reserves the right to change all information given in this document at any time without notice.

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