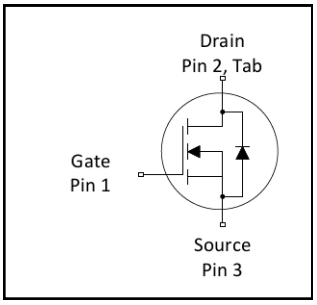
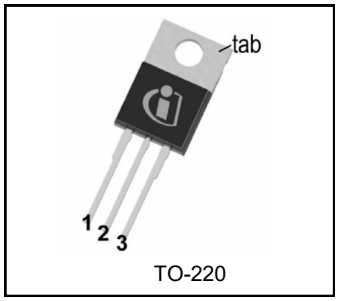
IRFB4020PbF

DIGITAL AUDIO MOSFET

$V_{(BR)DSS}$	200V
$R_{DS(on)}$ typ. @ 10V	80mΩ
Q_g typ.	18nC
Q_{sw} typ.	6.7nC
$R_{g(int)}$ typ.	3.2Ω
T_J max	175°C





G	D	S
Gate	Drain	Source

Features

- Key Parameters Optimized for Class-D Audio Amplifier Applications
- Low R_{DSON} for Improved Efficiency
- Low Q_G and Q_{SW} for Better THD and Improved Efficiency
- Low Q_{RR} for Better THD and Lower EMI
- 175°C Operating Junction Temperature for Ruggedness
- Can Deliver up to 200W per Channel into 8Ω Load in Half-Bridge Configuration Amplifier

Description

This Digital Audio MOSFET is specifically designed for Class-D audio amplifier applications. This MOSFET utilizes the latest processing techniques to achieve low on-resistance per silicon area. Furthermore, Gate charge, body-diode reverse recovery and internal Gate resistance are optimized to improve key Class-D audio amplifier performance factors such as efficiency, THD and EMI. Additional features of this MOSFET are 175°C operating junction temperature and repetitive avalanche capability. These features combine to make this MOSFET a highly efficient, robust and reliable device for ClassD audio amplifier applications.

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFB4020PbF	TO-220	Tube	50	IRFB4020PbF

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
V_{DS}	Drain-to-Source Voltage	200	V
V_{GS}	Gate-to-Source Voltage	± 20	V
I_D @ T_C = 25°C	Continuous Drain Current, V_{GS} @ 10V	18	A
I_D @ T_C = 100°C	Continuous Drain Current, V_{GS} @ 10V	13	
I_{DM}	Pulsed Drain Current ①	52	
P_D @T_C = 25°C	Maximum Power Dissipation ④	100	W
P_D @T_C = 100°C	Maximum Power Dissipation ④	52	W
	Linear Derating Factor	0.7	W/°C
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	10 lbf•in (1.1N•m)	

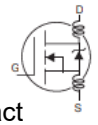
Thermal Resistance

Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case ④	—	1.43	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.50	—	
$R_{\theta JA}$	Junction-to-Ambient ④	—	62	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	—	—	V	V_{GS} = 0V, I_D = 250µA
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.23	—	V/°C	Reference to 25°C, I_D = 1mA
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	80	100	mΩ	V_{GS} = 10V, I_D = 11A ③
$V_{GS(th)}$	Gate Threshold Voltage	3.0	—	4.9	V	V_{DS} = V_{GS}, I_D = 100µA
$\Delta V_{GS(th)}/\Delta T_J$	Gate Threshold Voltage Temp. Coefficient	—	-13	—	mV/°C	
I_{DSS}	Drain-to-Source Leakage Current	—	—	20	µA	V_{DS} = 200V, V_{GS} = 0V
		—	—	250		V_{DS} = 200V,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	—	3.2	—	Ω	

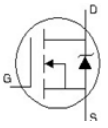
Dynamic Electrical Characteristics @ T_J = 25°C (unless otherwise specified)

gfs	Forward Trans conductance	24	—	—	S	V_{DS} = 50V, I_D = 11A
Q_g	Total Gate Charge	—	18	29	nC	I_D = 11A V_{DS} = 100V V_{GS} = 10V See Fig. 6 and 18
Q_{gs1}	Pre-Vth Gate-to-Source Charge	—	4.5	—		
Q_{gs2}	Post-Vth Gate-to-Source Charge	—	1.4	—		
Q_{gd}	Gate-to-Drain Charge	—	5.3	—		
Q_{godr}	Gate Charge Overdrive	—	6.8	—		
Q_{sw}	Switch Charge (Q_{gs2} + Q_{gd})	—	6.7	—		
$t_{d(on)}$	Turn-On Delay Time	—	7.8	—	ns	V_{DD} = 100V I_D = 10A R_G= 2.4Ω V_{GS} = 10V③
t_r	Rise Time	—	12	—		
$t_{d(off)}$	Turn-Off Delay Time	—	16	—		
t_f	Fall Time	—	6.3	—		
C_{iss}	Input Capacitance	—	1200	—	pF	V_{GS} = 0V V_{DS} = 50V f = 1.0MHz, See Fig. 5
C_{oss}	Output Capacitance	—	91	—		
C_{rss}	Reverse Transfer Capacitance	—	20	—		
C_{oss}	Effective Output Capacitance	—	110	—		V_{GS} = 0V, V_{DS} = 0V to 120V
L_D	Internal Drain Inductance	—	4.5	—	nH	Between lead, 6mm (0.25in.) from package and center of die contact 
L_S	Internal Source Inductance	—	7.5	—		

Avalanche Characteristics

E_{AS}	Single Pulse Avalanche Energy (Thermally Limited) ②	94	mJ
I_{AR}	Avalanche Current ⑤	See Fig.14,15, 16a, 16b	A
E_{AR}	Repetitive Avalanche Energy ⑤		mJ

Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	18	A	MOSFET symbol showing the integral reverse p-n junction diode. 
I_{SM}	Pulsed Source Current (Body Diode) ①	—	—	52		
V_{SD}	Diode Forward Voltage	—	—	1.3	V	T_J = 25°C,I_S = 11A,V_{GS} = 0V ③
t_{rr}	Reverse Recovery Time	—	82	120	ns	T_J = 25°C ,I_F = 11A, di/dt = 100A/µs ③
Q_{rr}	Reverse Recovery Charge	—	280	420	nC	

Notes:

① Repetitive rating; pulse width limited by max. junction temperature.

② Starting T_J = 25°C, L = 1.62mH, R_G = 25Ω, I_{AS} = 11A.

③ Pulse width ≤ 400µs; duty cycle ≤ 2%.

④ R_θ is measured at T_J approximately 90°C.

⑤ Limited by Tjmax. See Figs. 14, 15, 16a, 16b for repetitive avalanche information

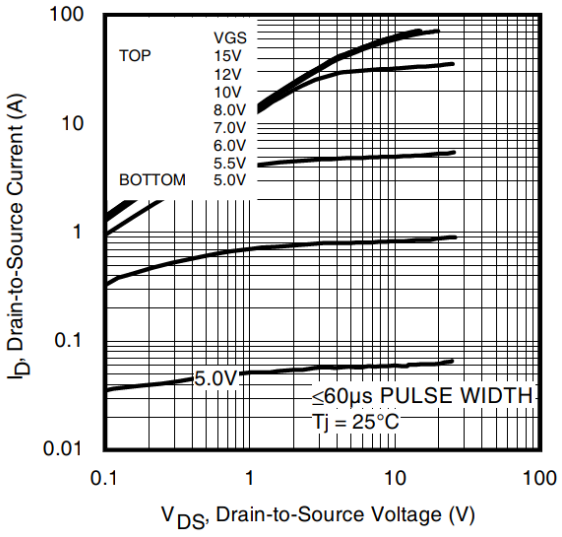


Fig. 1 Typical Output Characteristics

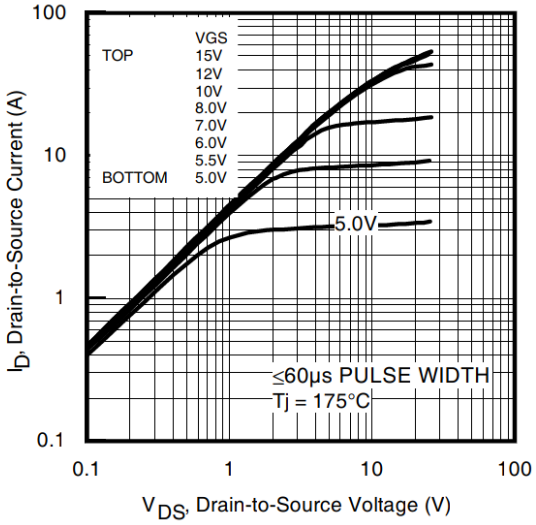


Fig. 2 Typical Output Characteristics

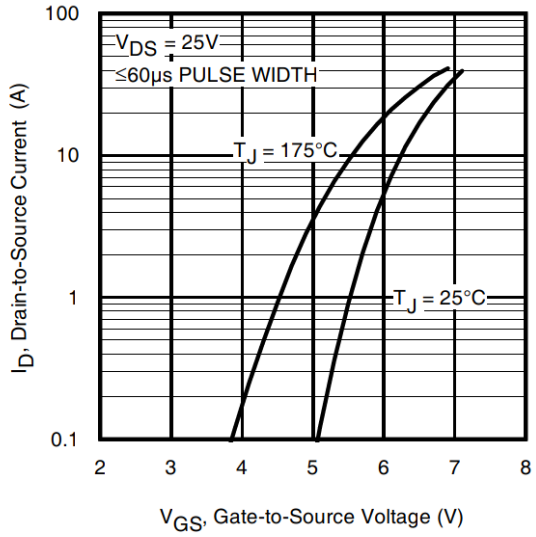


Fig. 3 Typical Transfer Characteristics

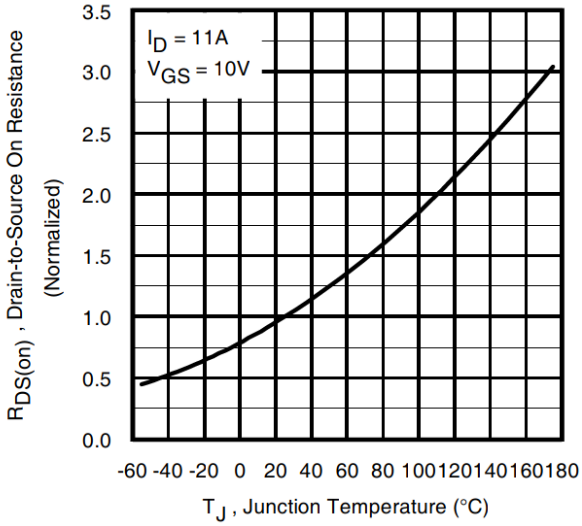


Fig. 4 Normalized On-Resistance vs. Temperature

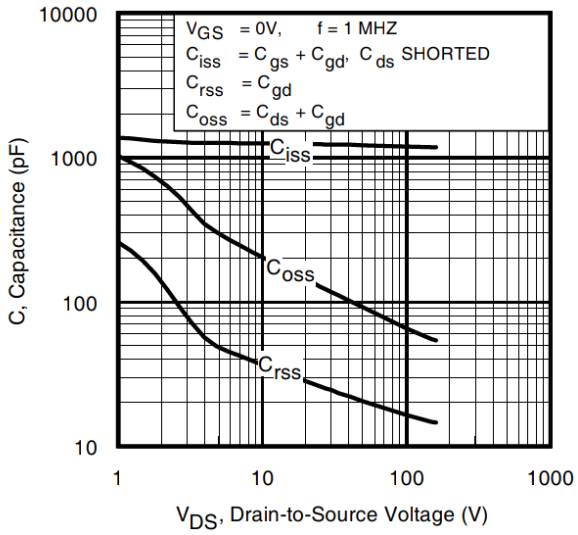


Fig 5. Typical Capacitance vs. Drain-to-Source Voltage

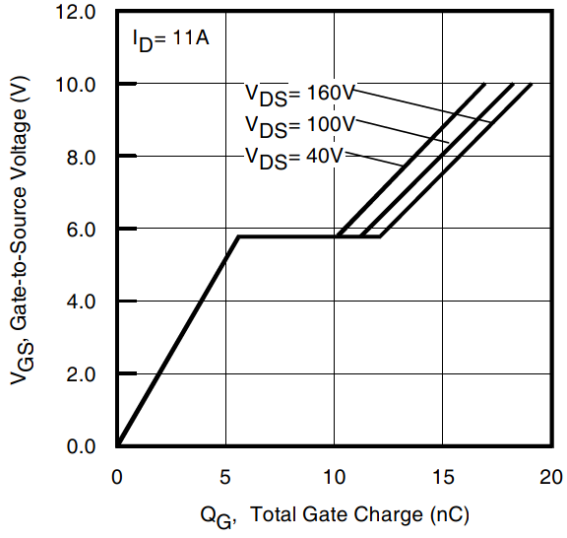


Fig 6. Typical Gate Charge vs. Gate-to-Source Voltage

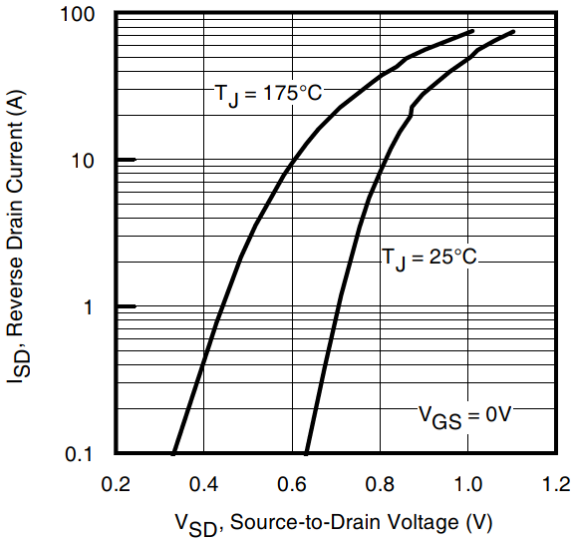


Fig. 7 Typical Source-to-Drain Diode Forward Voltage

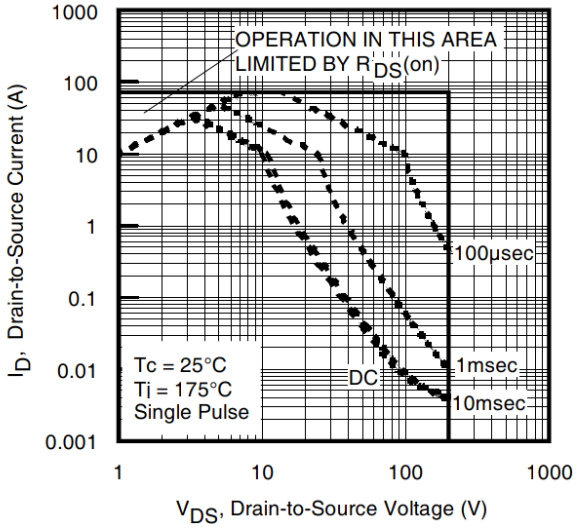


Fig 8. Maximum Safe Operating Area

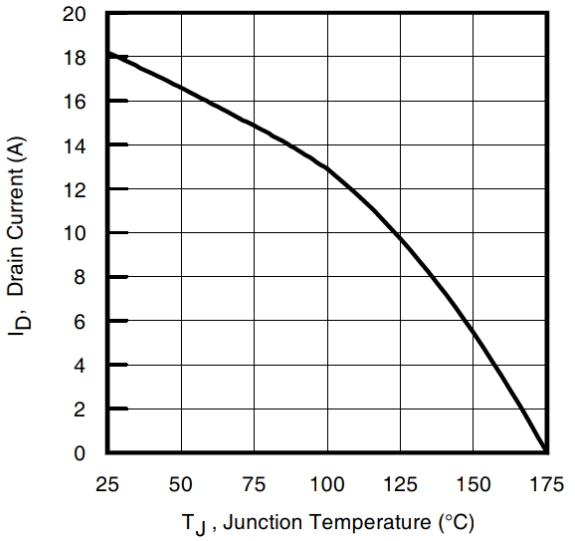


Fig 9. Maximum Drain Current vs. Case Temperature

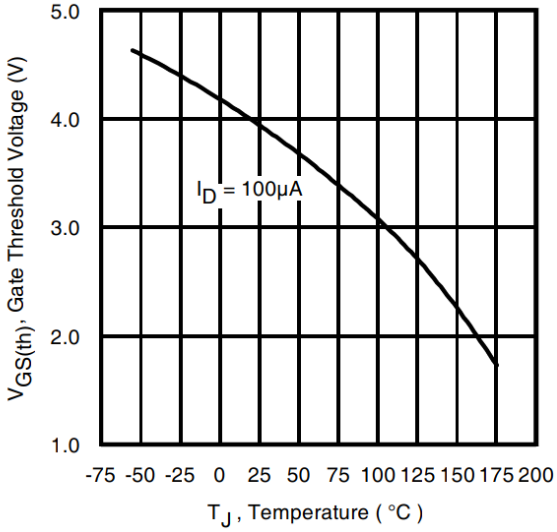


Fig 10. Threshold Voltage vs. Temperature

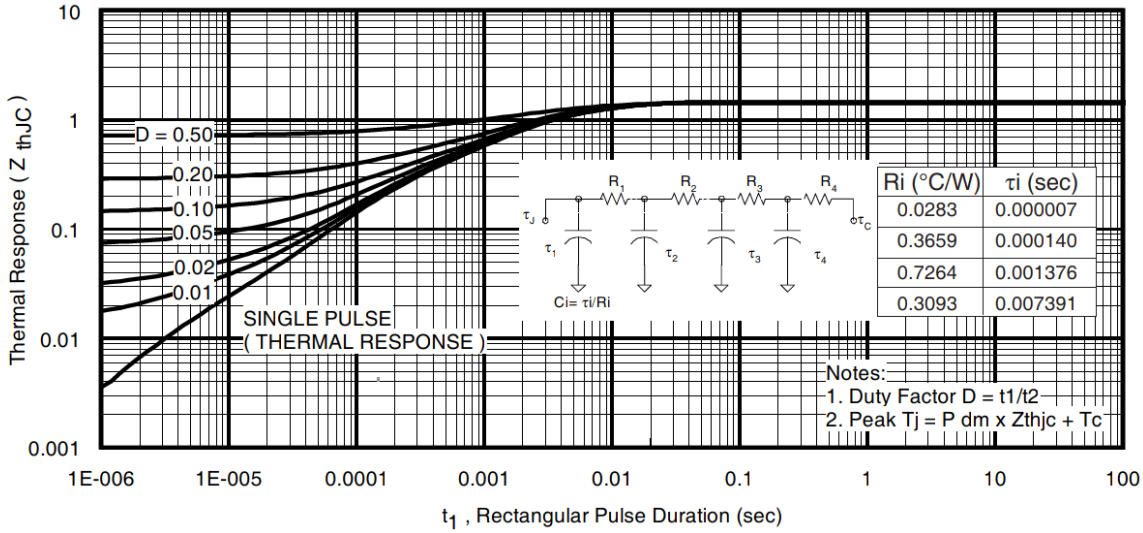


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case

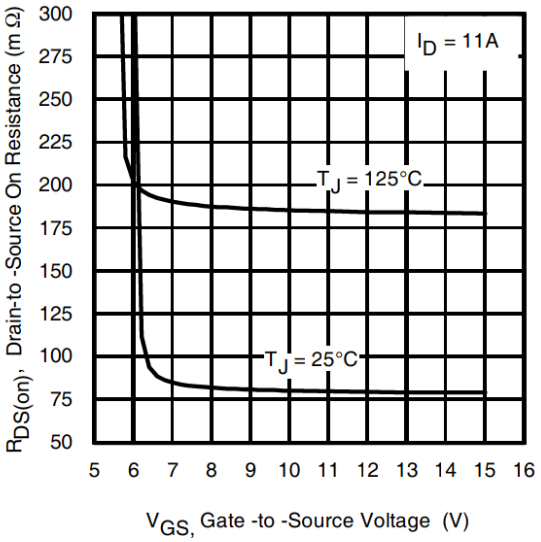


Fig 12. On-Resistance Vs. Gate Voltage

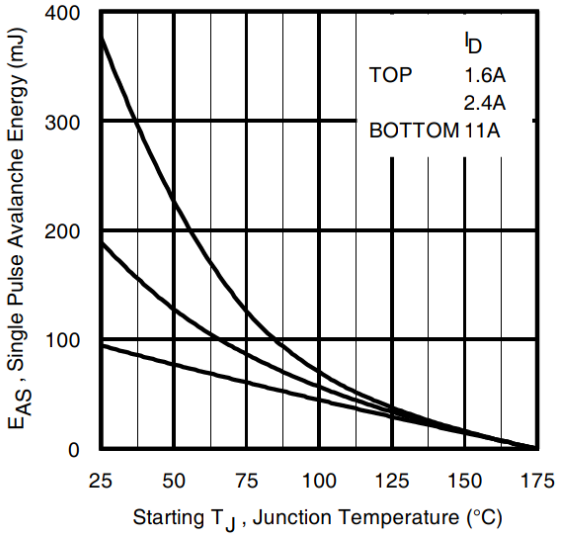


Fig 13. Maximum Avalanche Energy Vs. Drain Current

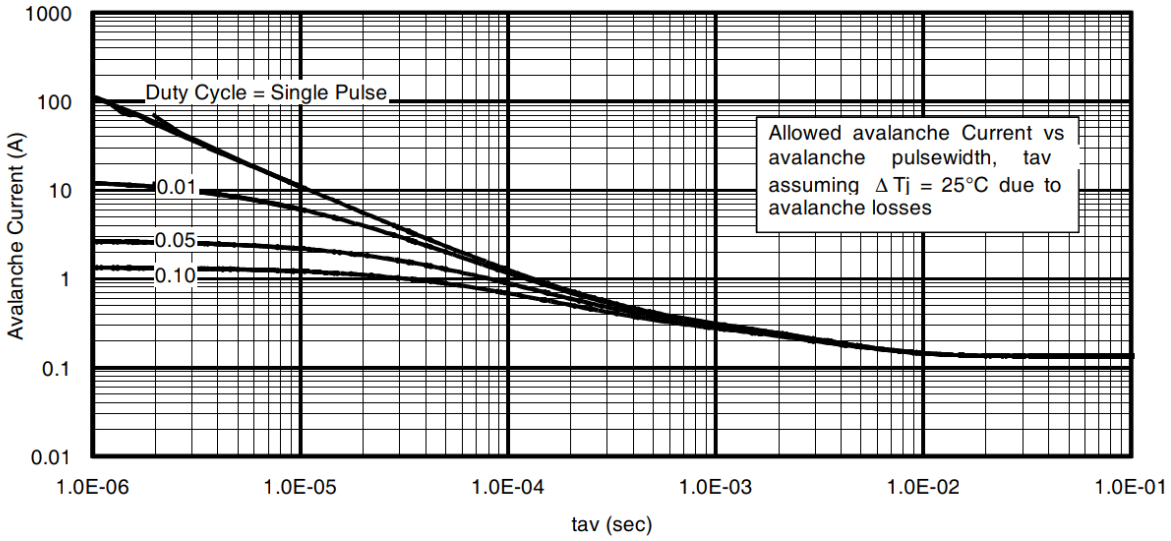


Fig 14. Typical Avalanche Current vs. Pulse width

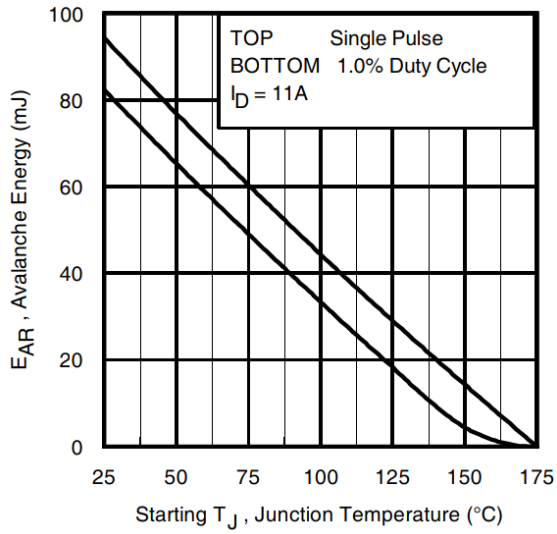


Fig 15. Maximum Avalanche Energy vs. Temperature

Notes on Repetitive Avalanche Curves , Figures 14, 15:
(For further info, see AN-1005 at www.infineon.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 18a, 18b.
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 13, 14).
   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)

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

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

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

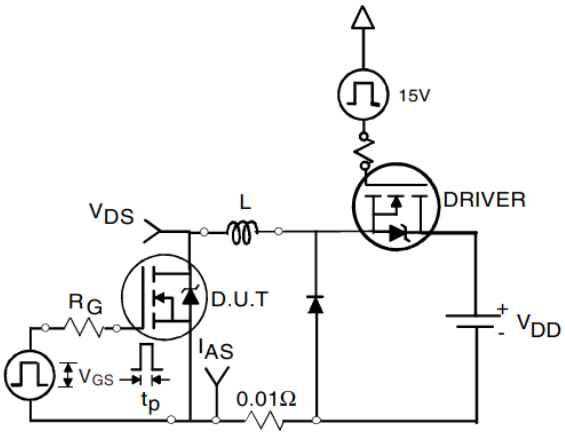


Fig 16a. Unclamped Inductive Test Circuit

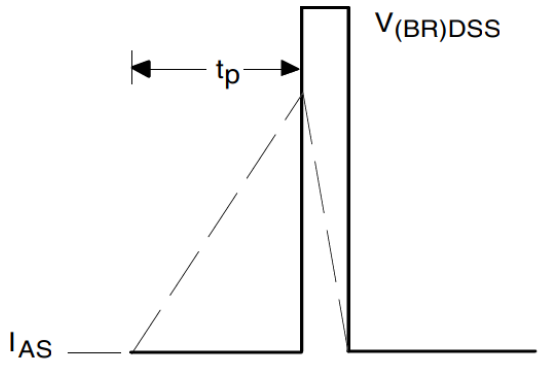


Fig 16b. Unclamped Inductive Waveforms

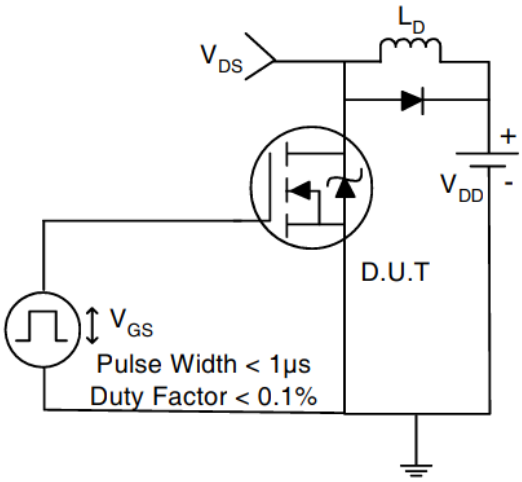


Fig 17a. Switching Time Test Circuit

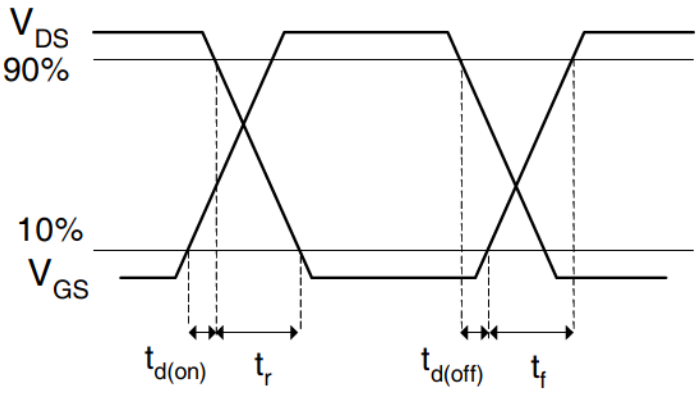


Fig 17b. Switching Time Waveforms

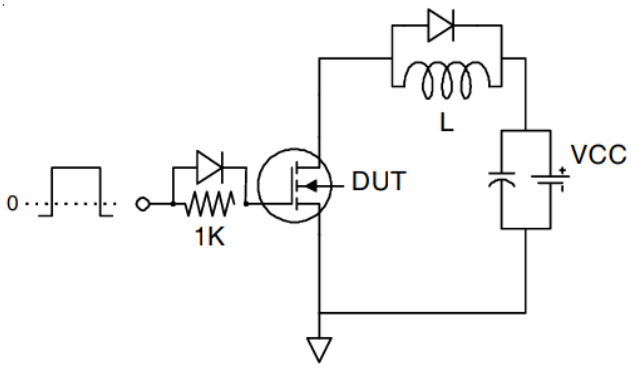


Fig 18a. Gate Charge Test Circuit

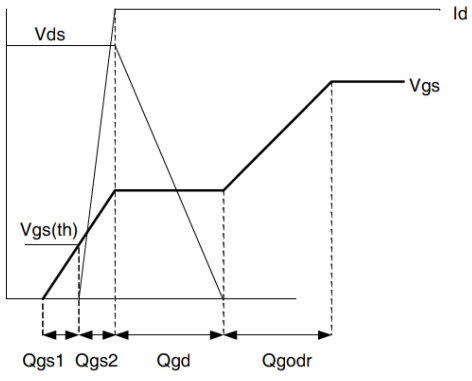
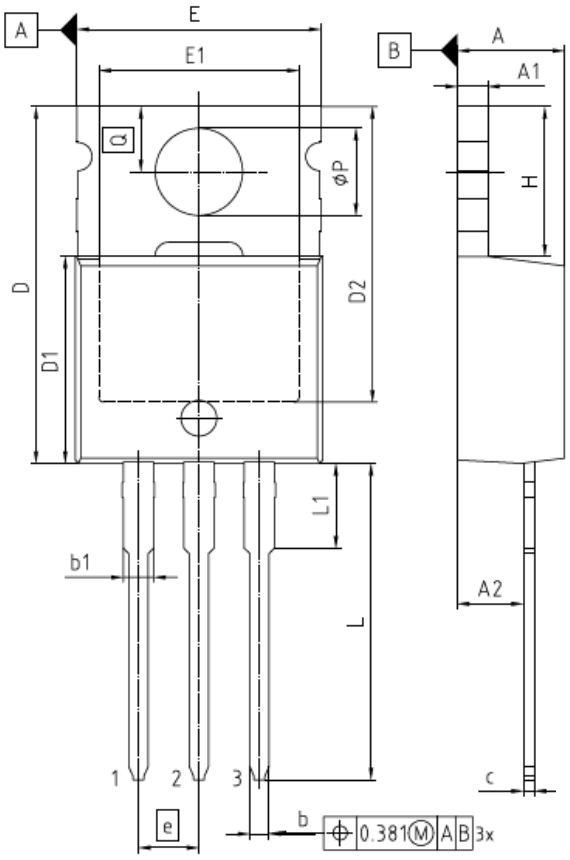


Fig 18b. Gate Charge Waveform

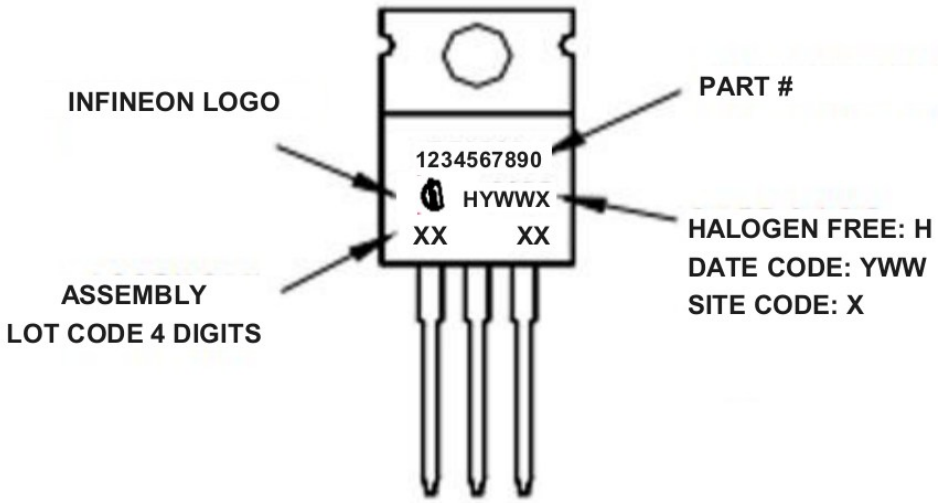
TO-220 Package Outline (Dimensions are shown in millimeters (inches))



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.

Revision History

Date	Rev.	Comments
2026-07-30	2.1	• Update datasheet to Infineon format • Updated Package Outline and Part marking –page 7 • Added disclaimer on last page.

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