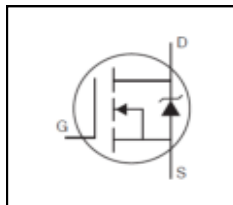


Features

- Advanced Process Technology
- Dynamic dv/dt Rating
- 175°C Operating Temperature
- Fast Switching
- Fully Avalanche Rated
- Ease of Paralleling
- Simple Drive Requirements
- Lead-Free



$V_{(BR)DSS}$	200V
$R_{DS(on)}$ max.	0.075Ω
I_D	30A

Description

IR MOSFET™ technology from Infineon utilizes advanced processing techniques to achieve extremely low on-resistance per silicon area. This benefit, combined with the fast switching speed and rugged device design that IR MOSFET™ devices are well known for, provides the designer with an extremely efficient and reliable device for use in a wide variety of applications.

The TO-247 package is preferred for commercial-industrial applications where higher power levels preclude the use of TO-220 devices. The TO-247 is similar but superior to the earlier TO-218 package because of its isolated mounting hole.



G	D	S
Gate	Drain	Source

Base part number	Package Type	Standard Pack		Orderable Part Number
		Form	Quantity	
IRFP250MPbF	TO-247AD	Tube	25	IRFP250MPbF

Absolute Maximum Ratings

Symbol	Parameter	Max.	Units
I_D @ $T_C = 25^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	30	A
I_D @ $T_C = 100^\circ\text{C}$	Continuous Drain Current, V_{GS} @ 10V	21	
I_{DM}	Pulsed Drain Current ①⑤	120	
P_D @ $T_C = 25^\circ\text{C}$	Maximum Power Dissipation	214	W
	Linear Derating Factor	1.4	W/°C
V_{GS}	Gate-to-Source Voltage	± 20	V
E_{AS}	Single Pulse Avalanche Energy ②⑤	315	mJ
I_{AR}	Avalanche Current ①⑤	30	A
E_{AR}	Repetitive Avalanche Energy ①	21	mJ
dv/dt	Peak Diode Recovery dv/dt③⑤	8.6	V/ns
T_J	Operating Junction and	-55 to + 175	°C
T_{STG}	Storage Temperature Range		
	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

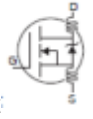
Symbol	Parameter	Typ.	Max.	Units
$R_{\theta JC}$	Junction-to-Case	—	0.7	°C/W
$R_{\theta CS}$	Case-to-Sink, Flat, Greased Surface	0.24	—	
$R_{\theta JA}$	Junction-to-Ambient	—	40	

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

	Parameter	Min.	Typ.	Max.	Units	Conditions
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	200	—	—	V	$V_{GS} = 0V, I_D = 250\mu A$
$\Delta V_{(BR)DSS}/\Delta T_J$	Breakdown Voltage Temp. Coefficient	—	0.26	—	V/ $^\circ\text{C}$	Reference to 25°C , $I_D = 1mA$
$R_{DS(on)}$	Static Drain-to-Source On-Resistance	—	—	0.075	Ω	$V_{GS} = 10V, I_D = 18A$ ④
$V_{GS(th)}$	Gate Threshold Voltage	2.0	—	4.0	V	$V_{DS} = V_{GS}, I_D = 250\mu A$
g_{fs}	Forward Trans conductance	17	—	—	S	$V_{DS} = 50V, I_D = 18A$ ④
I_{DSS}	Drain-to-Source Leakage Current	—	—	25	μA	$V_{DS} = 200V, V_{GS} = 0V$
		—	—	250		$V_{DS} = 160V, V_{GS} = 0V, T_J = 150^\circ\text{C}$
I_{GSS}	Gate-to-Source Forward Leakage	—	—	100	nA	$V_{GS} = 20V$
	Gate-to-Source Reverse Leakage	—	—	-100		$V_{GS} = -20V$

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

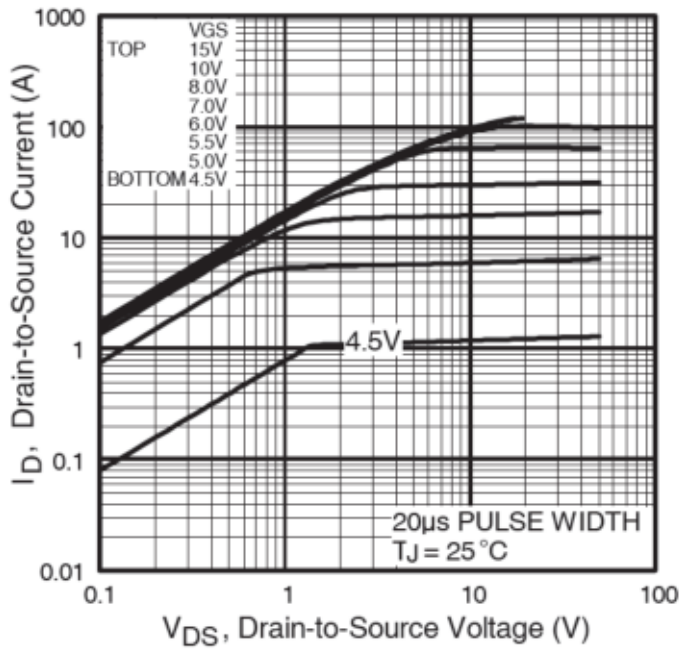
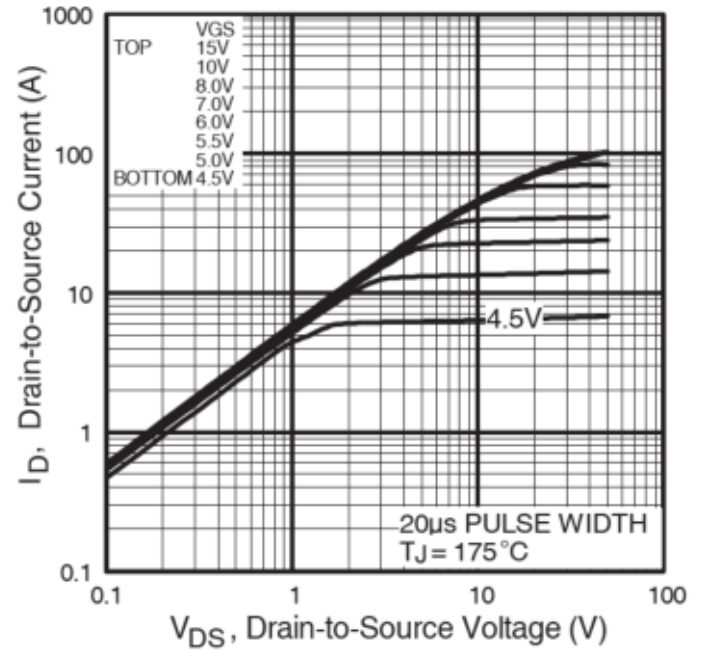
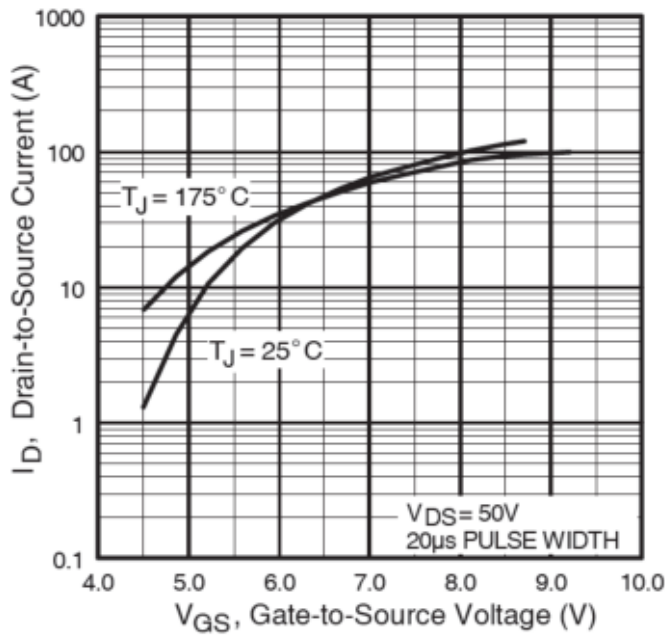
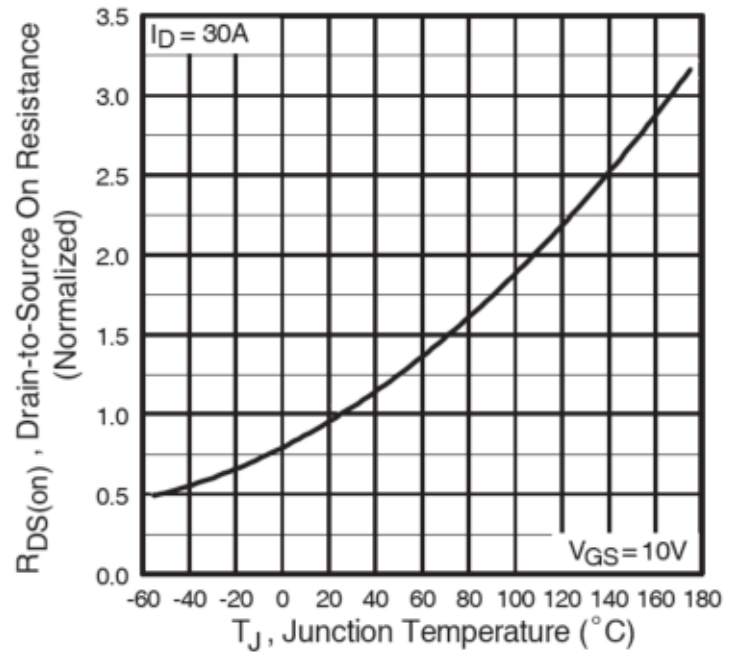
Q_g	Total Gate Charge	—	—	123	nC	$I_D = 18A$
Q_{gs}	Gate-to-Source Charge	—	—	21		$V_{DS} = 160V$
Q_{gd}	Gate-to-Drain Charge	—	—	57		$V_{GS} = 10V$, See Fig.6 and 13 ④
$t_{d(on)}$	Turn-On Delay Time	—	14	—	ns	$V_{DD} = 100V$
t_r	Rise Time	—	43	—		$I_D = 18A$
$t_{d(off)}$	Turn-Off Delay Time	—	41	—		$R_G = 3.9\Omega$
t_f	Fall Time	—	33	—		$R_D = 5.5\Omega$, See Fig.10 ④
L_D	Internal Drain Inductance	—	5.0	—	nH	Between lead, 6mm (0.25in.)
L_S	Internal Source Inductance	—	13	—		from package and center of die contact
C_{iss}	Input Capacitance	—	2159	—	pF	$V_{GS} = 0V$
C_{oss}	Output Capacitance	—	315	—		$V_{DS} = 25V$
C_{rss}	Reverse Transfer Capacitance	—	83	—		$f = 1.0MHz$, See Fig.5


Diode Characteristics

	Parameter	Min.	Typ.	Max.	Units	Conditions
I_S	Continuous Source Current (Body Diode)	—	—	30	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	—	—	1.3	V	$T_J = 25^\circ\text{C}, I_S = 18A, V_{GS} = 0V$ ④
t_{rr}	Reverse Recovery Time	—	186	279	ns	$T_J = 25^\circ\text{C}, I_F = 18A$
Q_{rr}	Reverse Recovery Charge	—	1.3	2.0	μC	$di/dt = 100A/\mu s$ ④

Notes:

- ① Repetitive rating; pulse width limited by max. junction temperature. (See fig. 11).
- ② Starting $T_J = 25^\circ\text{C}$, $L = 1.9mH$, $R_G = 25\Omega$, $I_{AS} = 18A$. (See fig. 12).
- ③ $I_{SD} \leq 18A$, $di/dt \leq 374A/\mu s$, $V_{DD} \leq V_{(BR)DSS}$, $T_J \leq 175^\circ\text{C}$.
- ④ Pulse width $\leq 300\mu s$; duty cycle $\leq 2\%$.


Fig. 1 Typical Output Characteristics

Fig. 2 Typical Output Characteristics

Fig. 3 Typical Transfer Characteristics

Fig. 4 Normalized On-Resistance vs. Temperature

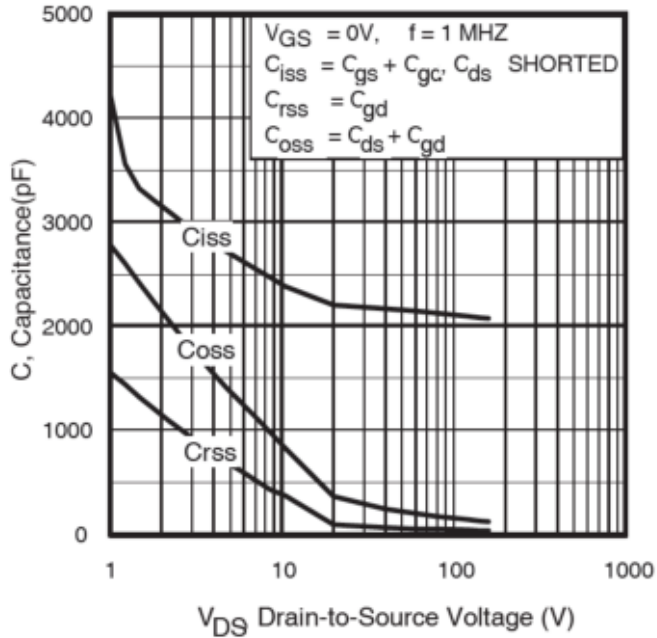


Fig 5. Typical Capacitance vs.
Drain-to-Source Voltage

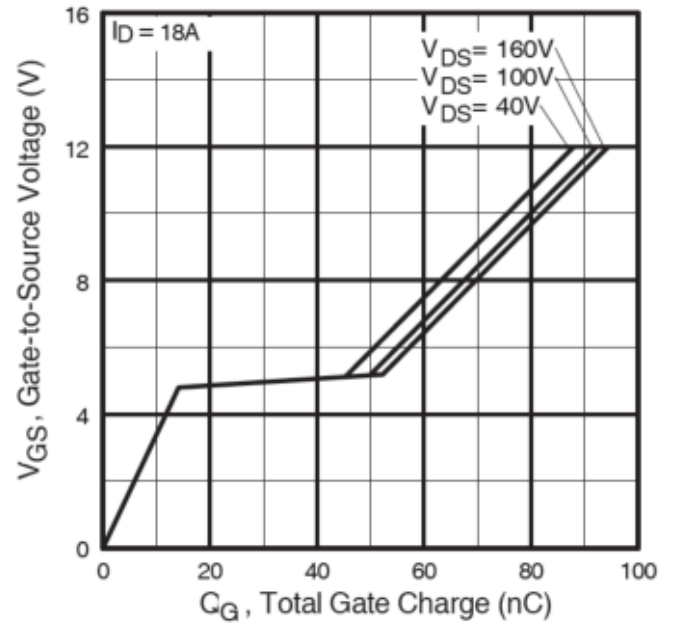


Fig 6. Typical Gate Charge vs.
Gate-to-Source Voltage

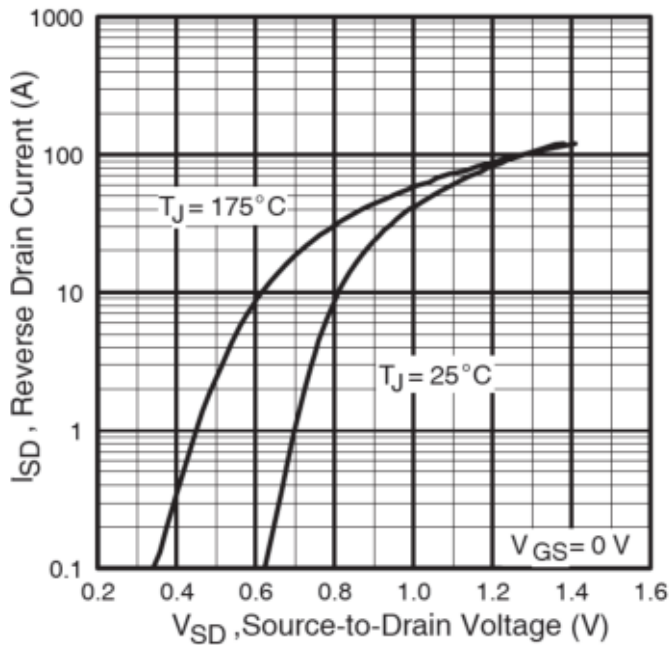


Fig. 7 Typical Source-to-Drain Diode
Forward Voltage

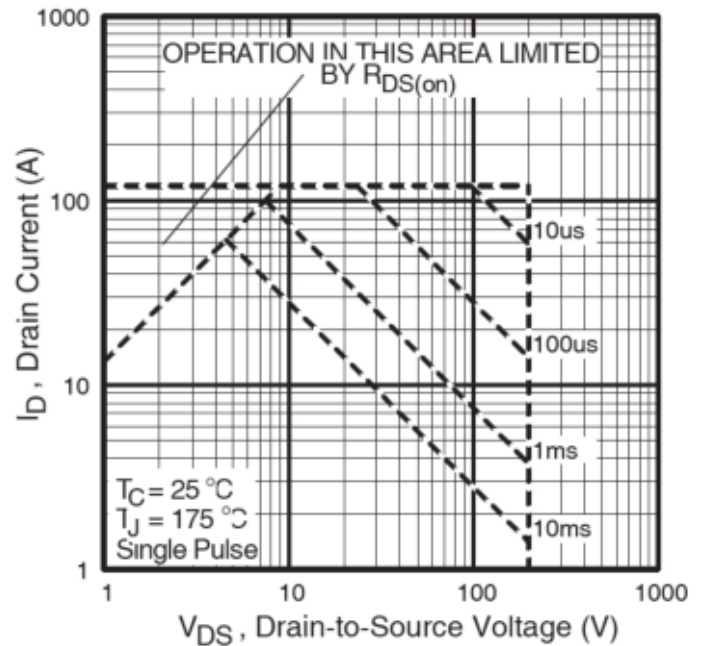


Fig 8. Maximum Safe Operating Area

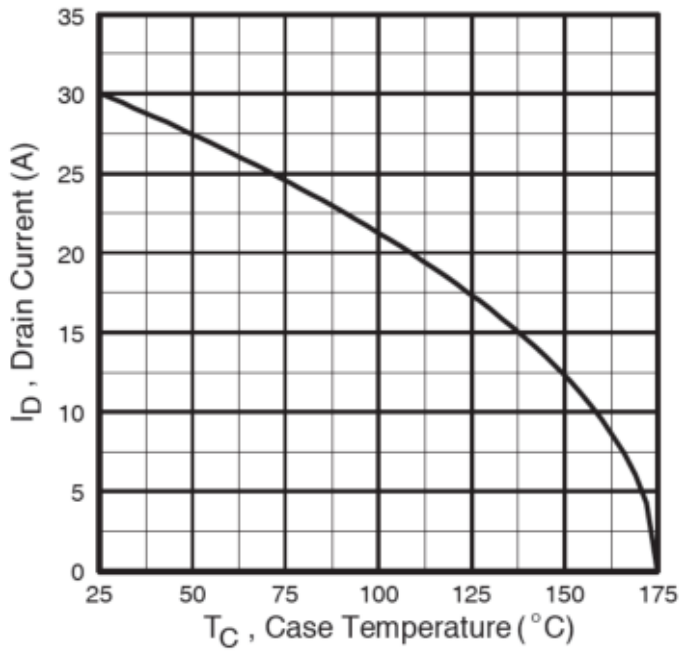


Fig 9. Maximum Drain Current vs. Case Temperature

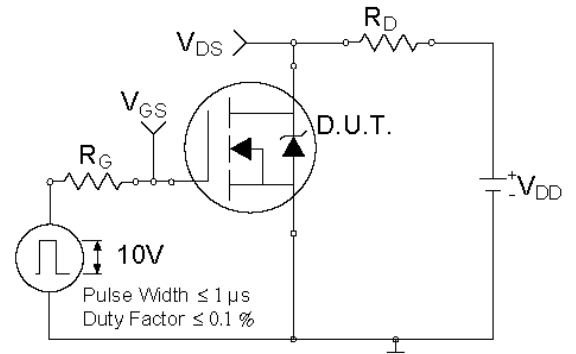


Fig 10a. Switching Time Test Circuit

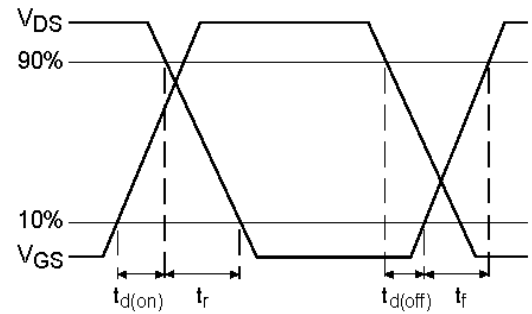


Fig 10a. Switching Time Waveforms

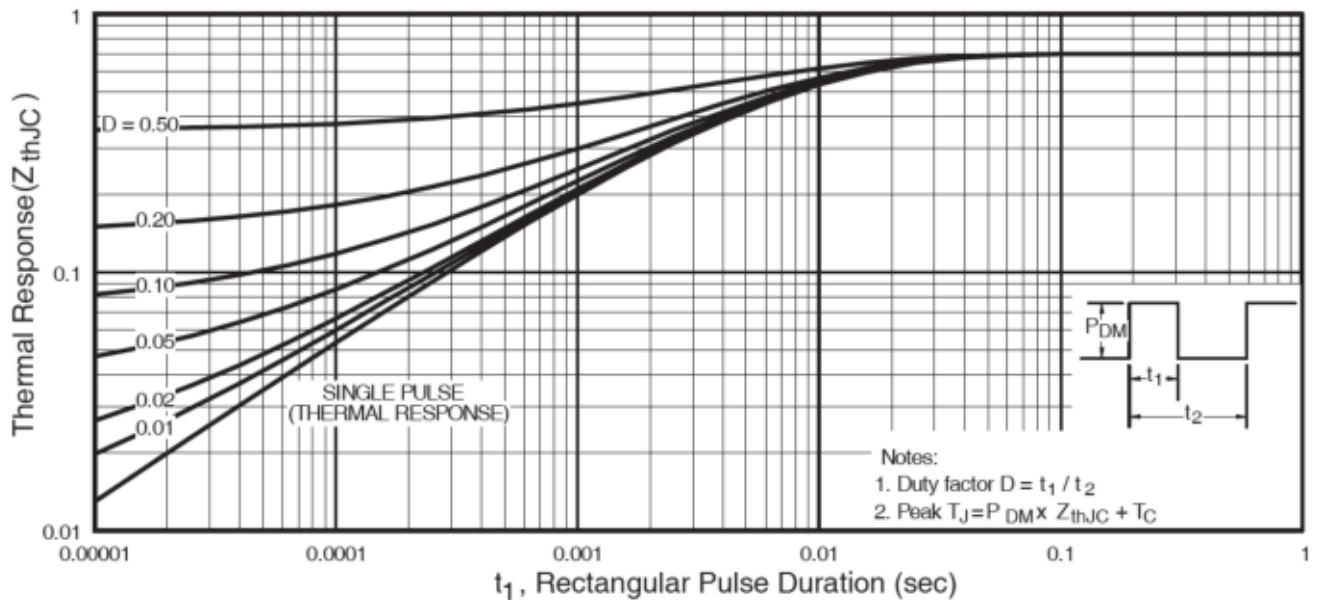
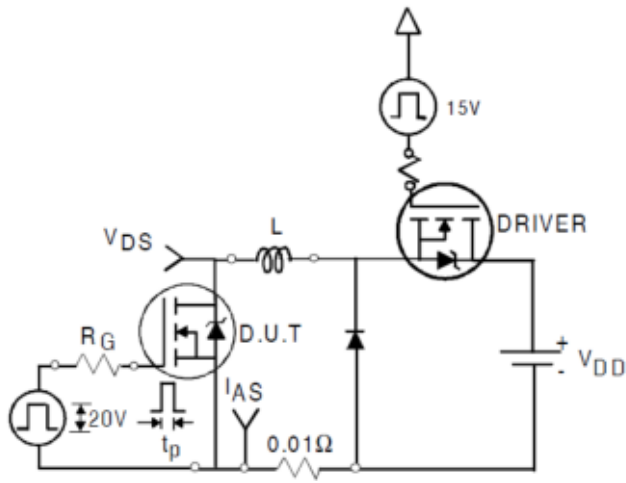
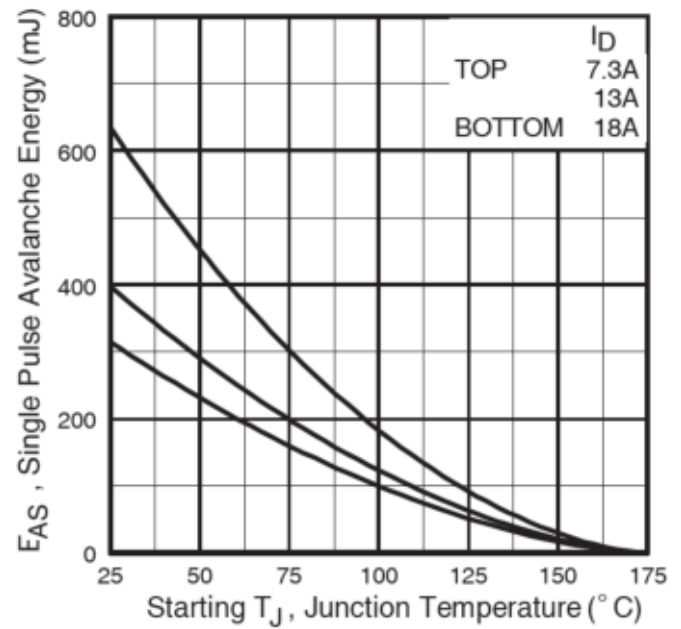
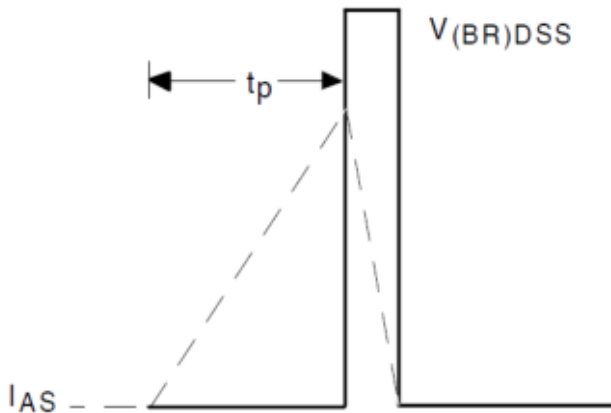
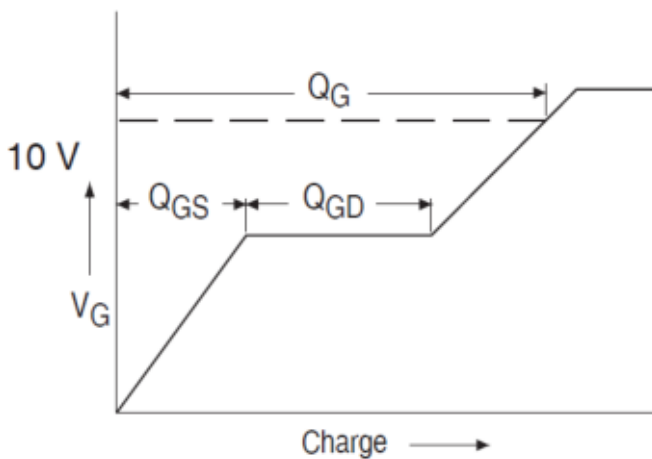
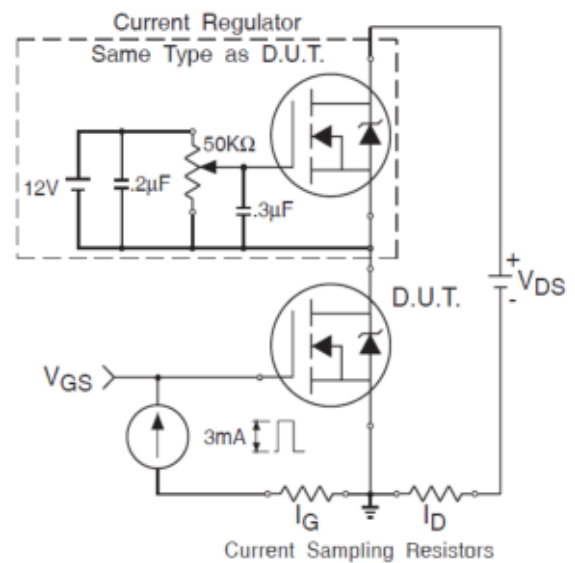


Fig 11. Maximum Effective Transient Thermal Impedance, Junction-to-Case


Fig. 12a. Unclamped Inductive Test Circuit

Fig 12c. Maximum Avalanche Energy vs. Drain Current

Fig. 12b. Unclamped Inductive Waveforms

Fig 13a. Basic Gate Charge Waveform

Fig 13b. Gate Charge Test Circuit

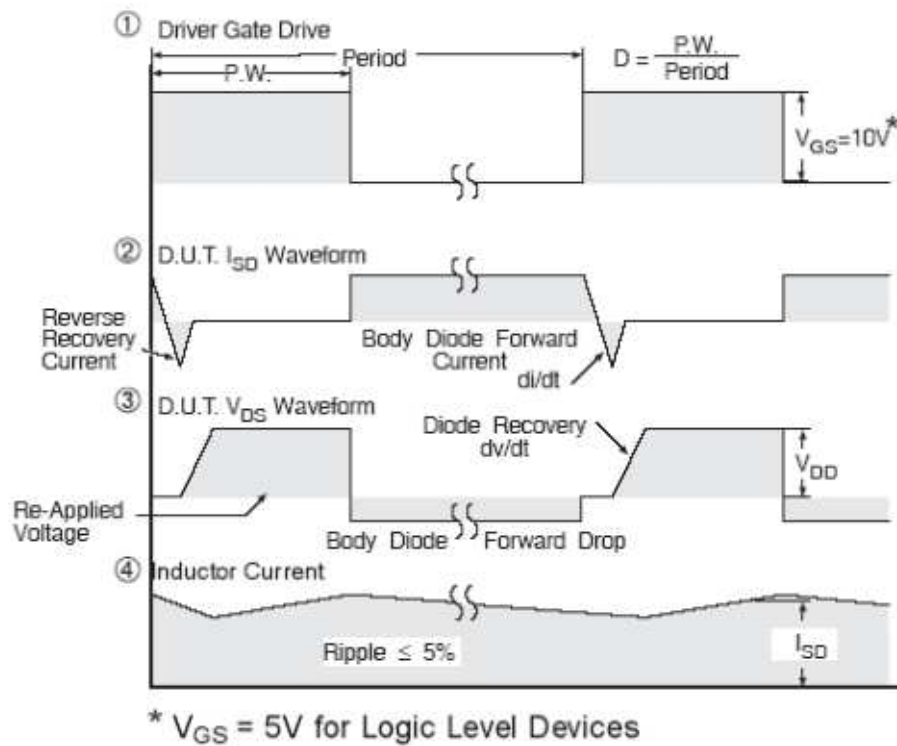
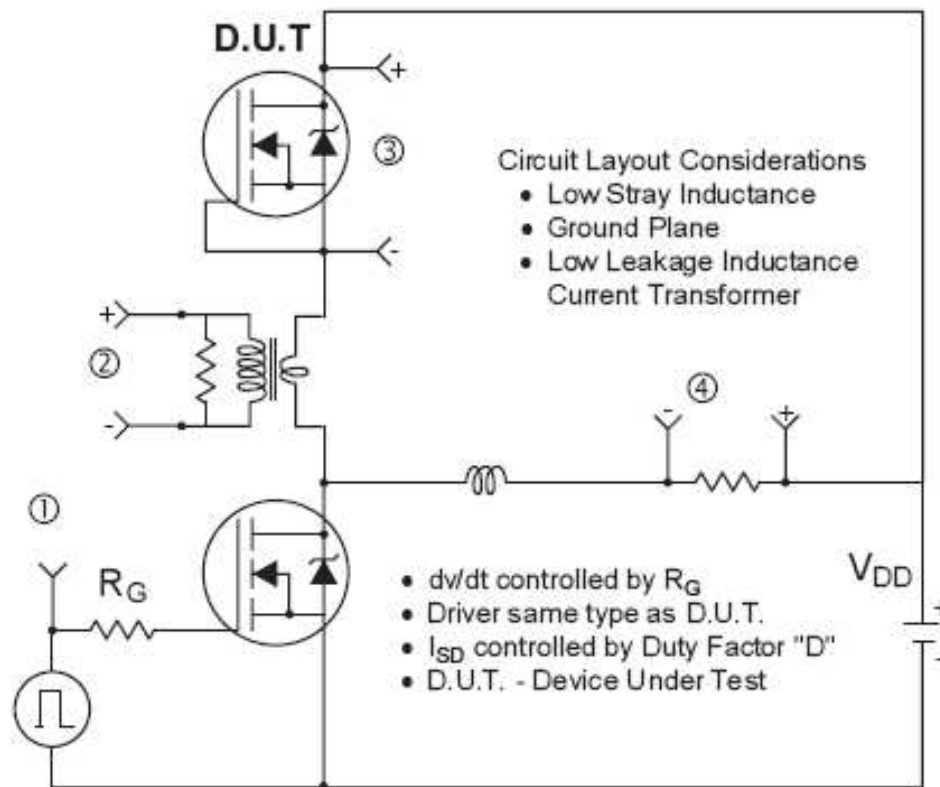
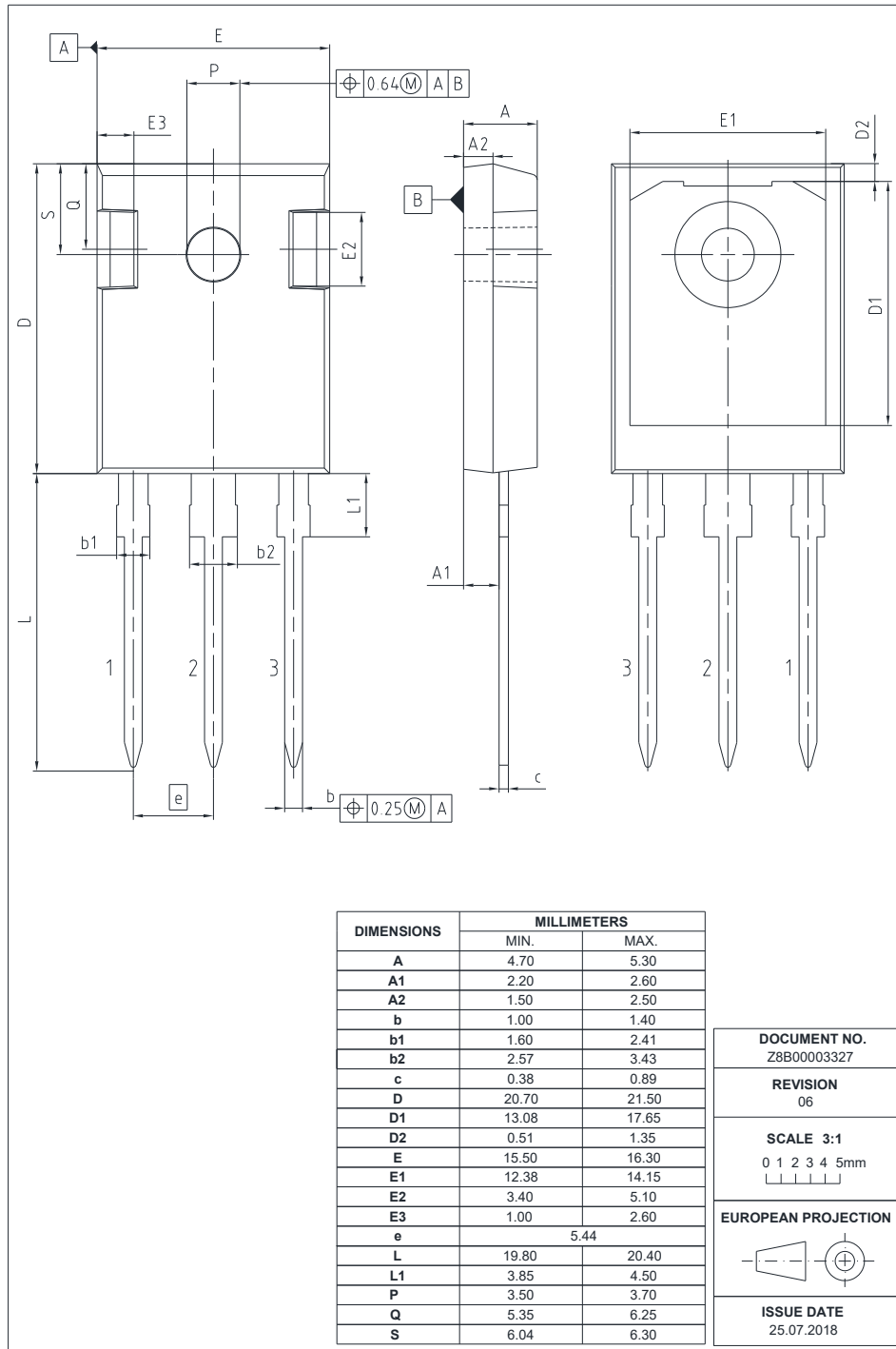
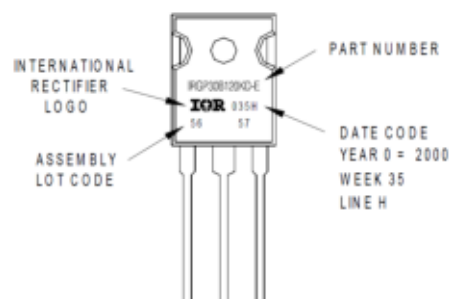


Fig 14. Peak Diode Recovery dv/dt Test Circuit for N-Channel IR MOSFET™

TO-247AD Package Outline (Dimensions are shown in millimeters (inches))

TO-247AD Part Marking Information

EXAMPLE: THIS IS AN IRGP30B120KD-E
WITH ASSEMBLY
LOT CODE 5657
ASSEMBLED ON WW 35, 2000
IN THE ASSEMBLY LINE "H"

Note: "P" in assembly line position
indicates "Lead-Free"



Revision History

Date	Comments
05/28/2020	- Updated datasheet with corporate template - Updated Package picture-page1 - Corrected from "Hexfet power MOSFET" to " IR MOSFET™" -page1 &7 - Corrected part marking from TO-247AC to TO-247AD on page 8.

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