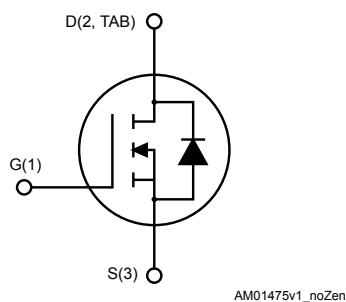
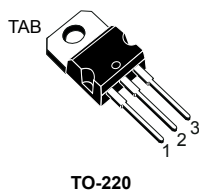


N-channel 200 V, 0.29 Ω typ., 9 A, STripFET™ Power MOSFET in a TO-220 package



Product status link

[IRF630](#)

Product summary

Order code	IRF630
Marking	IRF630
Package	TO-220
Packing	Tube

Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
IRF630	200 V	0.40 Ω	9 A

- Extremely high dv/dt capability
- Very low intrinsic capacitance
- Gate charge minimized

Applications

- Switching applications

Description

This Power MOSFET series realized with STMicroelectronics unique STripFET™ process has specifically been designed to minimize input capacitance and gate charge. It is therefore suitable as primary switch in advanced high-efficiency isolated DC-DC converters.

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DDS}	Drain-source voltage ($V_{GS} = 0\text{ V}$)	200	V
V_{DGR}	Drain-gate voltage ($R_{GS} = 20\text{ k}\Omega$)	200	V
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current (continuous) at $T_C = 25\text{ }^\circ\text{C}$	9	A
	Drain current (continuous) at $T_C = 100\text{ }^\circ\text{C}$	6.5	A
$I_{DM}^{(1)}$	Drain current (pulsed)	36	A
P_{TOT}	Total power dissipation at $T_C = 25\text{ }^\circ\text{C}$	120	W
$E_{AS}^{(2)}$	Single pulse avalanche energy	110	mJ
$dv/dt^{(3)}$	Drain-body diode dynamic dv/dt ruggedness	5.8	V/ns
T_{stg}	Storage temperature range	-65 to 175	$^\circ\text{C}$
T_J	Operating junction temperature range		

1. Pulse width is limited by safe operating area.
2. Starting $T_J = 25\text{ }^\circ\text{C}$, $I_D = 4.5\text{ A}$
3. $I_{SD} = 9\text{ A}$, $di/dt = 520\text{ A}/\mu\text{s}$, $V_{DD} = 50\text{ V}$, $T_J < T_{Jmax}$

Table 2. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-case}$	Thermal resistance junction-case	1.26	$^\circ\text{C}/\text{W}$
$R_{thj-amb}$	Thermal resistance junction-ambient	62.5	$^\circ\text{C}/\text{W}$

2 Electrical characteristics

$T_{CASE} = 25\text{ }^{\circ}\text{C}$ unless otherwise specified

Table 3. On/off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain-source breakdown voltage	$V_{GS} = 0\text{ V}$, $I_D = 250\text{ }\mu\text{A}$	200			V
I_{DSS}	Zero gate voltage drain current	$V_{GS} = 0\text{ V}$, $V_{DS} = 200\text{ V}$			1	μA
		$V_{GS} = 0\text{ V}$, $V_{DS} = 200\text{ V}$, $T_C = 125\text{ }^{\circ}\text{C}^{(1)}$			100	μA
I_{GSS}	Gate body leakage current	$V_{DS} = 0\text{ V}$, $V_{GS} = 20\text{ V}$			± 100	nA
$V_{GS(th)}$	Gate threshold voltage	$V_{DS} = V_{GS}$, $I_D = 250\text{ }\mu\text{A}$	2	3	4	V
$R_{DS(on)}$	Static drain-source on-resistance	$V_{GS} = 10\text{ V}$, $I_D = 4.5\text{ A}$		0.29	0.40	Ω

1. Defined by design, not subject to production test.

Table 4. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	$V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$, $V_{GS} = 0\text{ V}$	-	370	-	pF
C_{oss}	Output capacitance		-	77	-	pF
C_{rss}	Reverse transfer capacitance		-	14	-	pF
Q_g	Total gate charge	$V_{DD} = 160\text{ V}$, $I_D = 9\text{ A}$	-	11.6	-	nC
Q_{gs}	Gate-source charge	$V_{GS} = 0\text{ to }10\text{ V}$	-	2.2	-	nC
Q_{gd}	Gate-drain charge	(see Figure 13. Test circuit for gate charge behavior)	-	5.5	-	nC

Table 5. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on delay time	$V_{DD} = 100\text{ V}$, $I_D = 4.5\text{ A}$, $R_G = 4.7\text{ }\Omega$, $V_{GS} = 10\text{ V}$	-	5.6	-	ns
t_r	Rise time	(see Figure 12. Test circuit for resistive load switching times and Figure 17. Switching time waveform)	-	2.6	-	ns

Table 6. Source-drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
$V_{SD}^{(1)}$	Forward on voltage	$I_{SD} = 9\text{ A}$, $V_{GS} = 0\text{ V}$	-		1.5	V
t_{rr}	Reverse recovery time	$I_{SD} = 9\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$, $V_{DD} = 50\text{ V}$ (see Figure 17. Switching time waveform)	-	118.5		ns
Q_{rr}	Reverse recovery charge		-	393		nC
I_{RRM}	Reverse recovery current		-	6.6		A

1. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

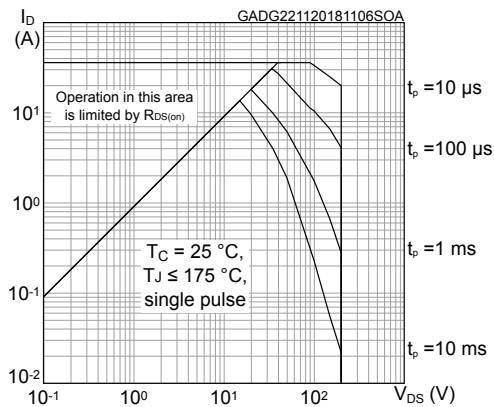
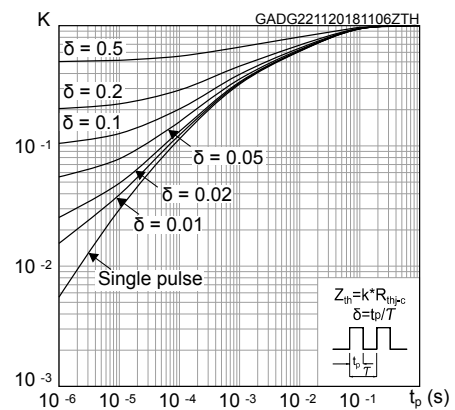
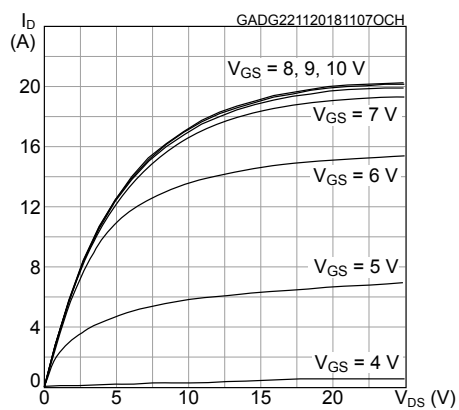
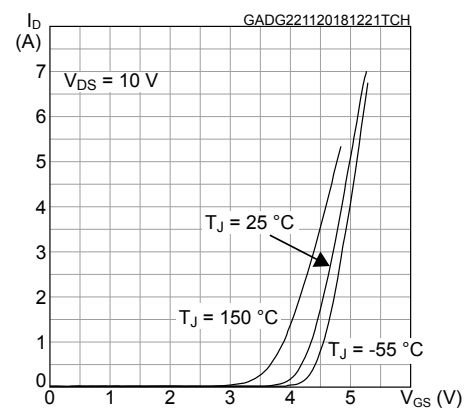
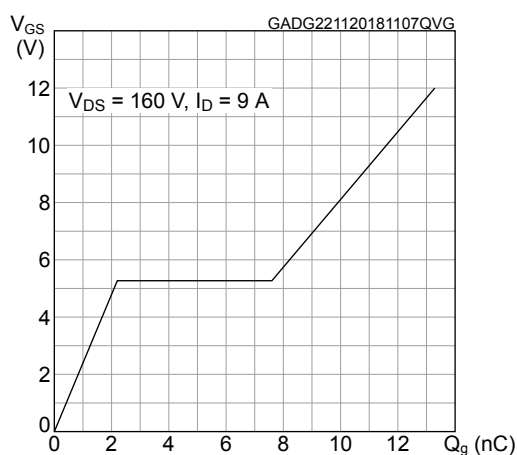
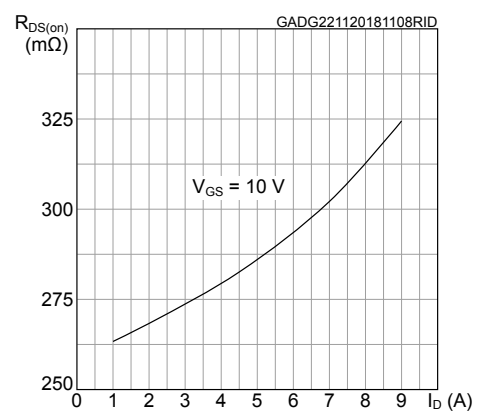
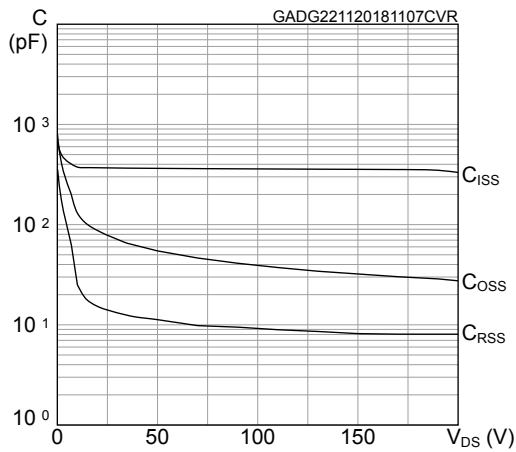
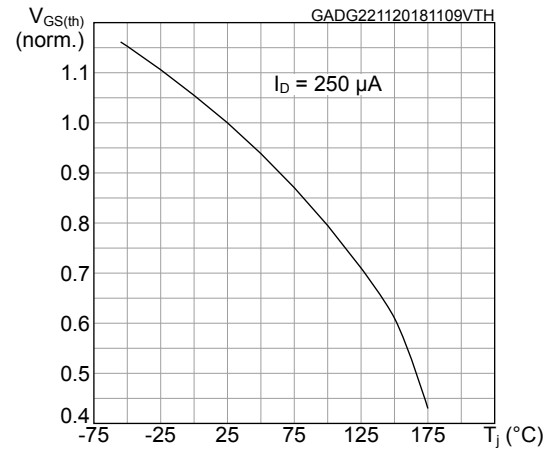
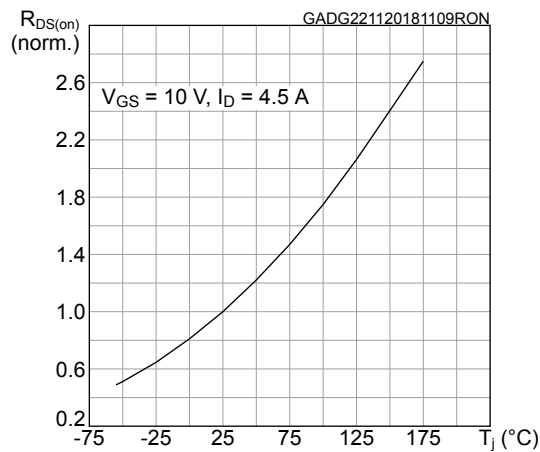
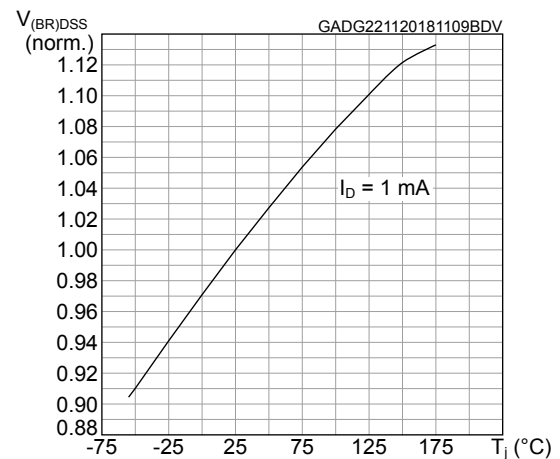
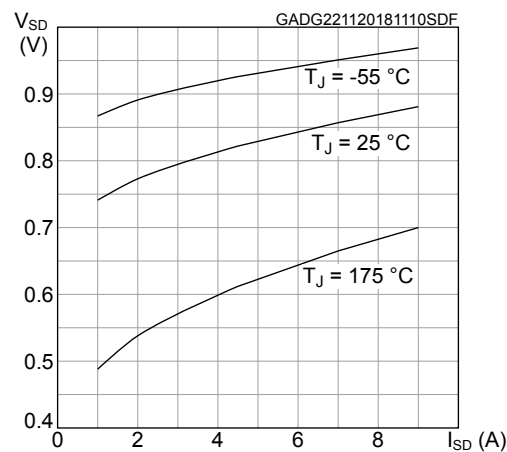
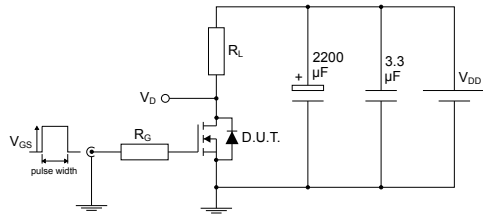
Figure 1. Safe operating area

Figure 2. Thermal impedance

Figure 3. Output characteristics

Figure 4. Transfer characteristics

Figure 5. Gate charge vs gate-source voltage

Figure 6. Static drain-source on-resistance


Figure 7. Capacitance variations

Figure 8. Normalized gate threshold voltage vs temperature

Figure 9. Normalized on-resistance vs temperature

Figure 10. Normalized $V_{(BR)DSS}$ vs temperature

Figure 11. Source-drain diode forward characteristics


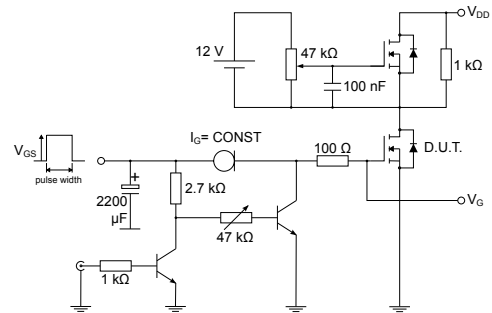
3 Test circuits

Figure 12. Test circuit for resistive load switching times



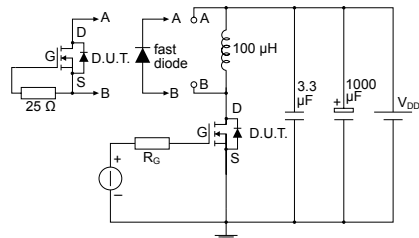
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Figure 13. Test circuit for gate charge behavior



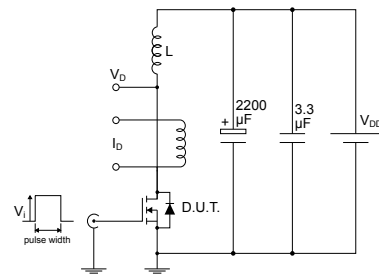
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Figure 14. Test circuit for inductive load switching and diode recovery times



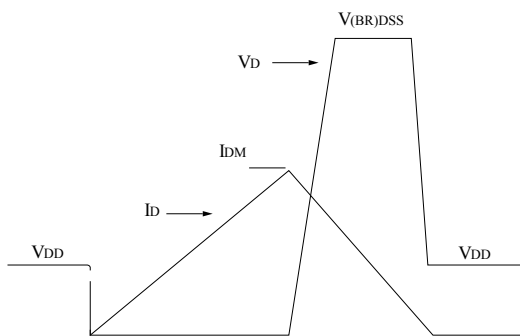
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Figure 15. Unclamped inductive load test circuit



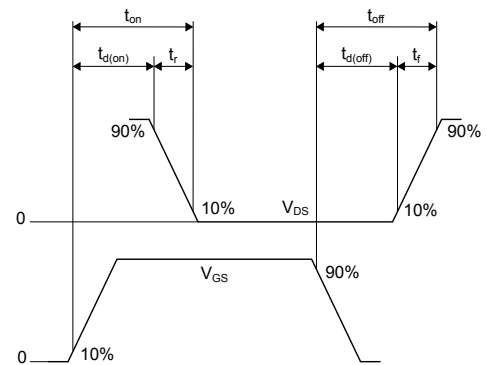
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Figure 16. Unclamped inductive waveform



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Figure 17. Switching time waveform



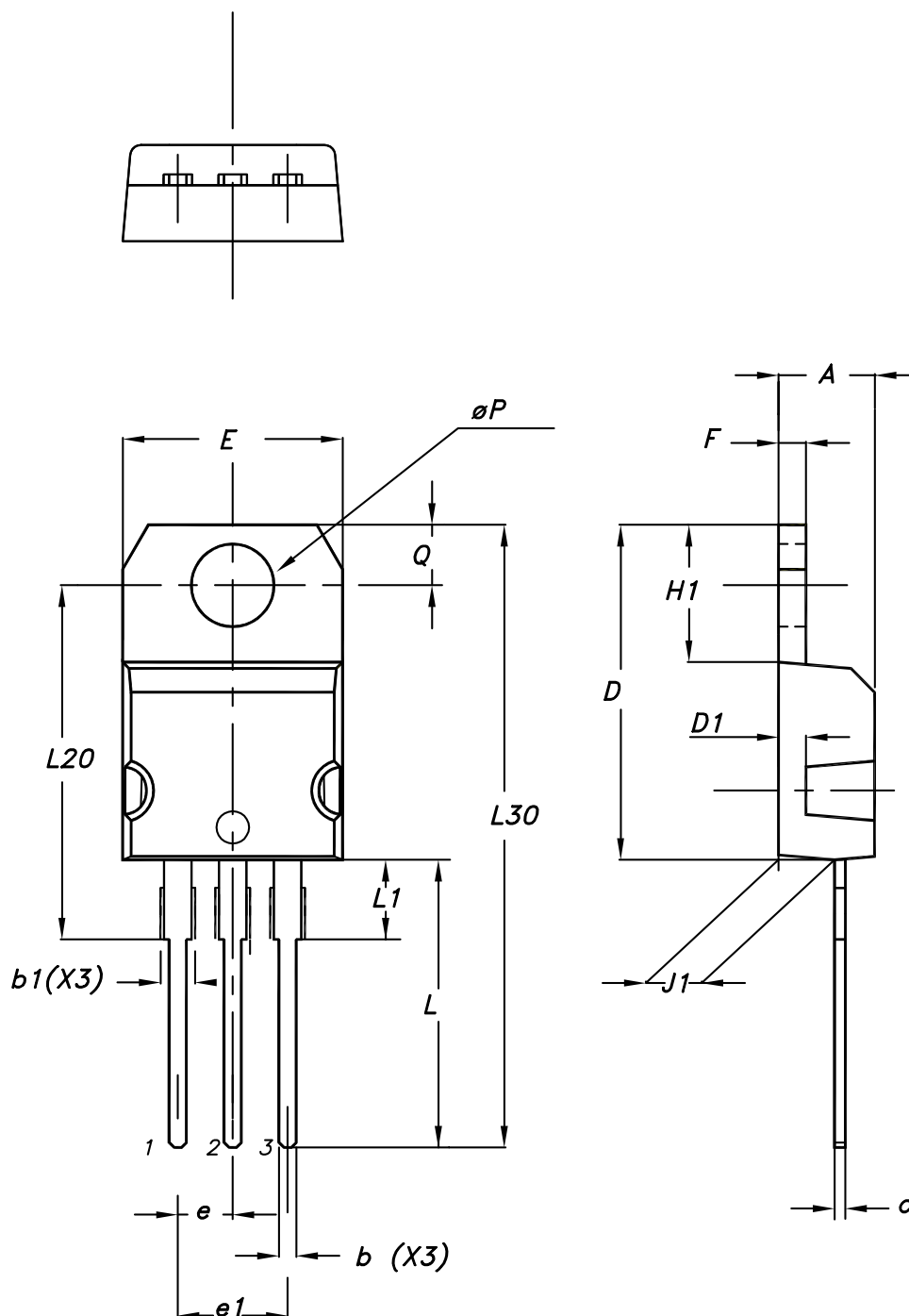
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4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of **ECOPACK®** packages, depending on their level of environmental compliance. ECOPACK® specifications, grade definitions and product status are available at: www.st.com. ECOPACK® is an ST trademark.

4.1 TO-220 type A package information

Figure 18. TO-220 type A package outline



0015988_typeA_Rev_22

Table 7. TO-220 type A package mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
b	0.61		0.88
b1	1.14		1.55
c	0.48		0.70
D	15.25		15.75
D1		1.27	
E	10.00		10.40
e	2.40		2.70
e1	4.95		5.15
F	1.23		1.32
H1	6.20		6.60
J1	2.40		2.72
L	13.00		14.00
L1	3.50		3.93
L20		16.40	
L30		28.90	
øP	3.75		3.85
Q	2.65		2.95

Revision history

Table 8. Document revision history

Date	Version	Changes
09-Sep-2004	8	Complete version
03-Aug-2006	9	New template, no content change
12-Dec-2018	10	Part number IRF630FP has been moved to a separate datasheet and the document has been updated accordingly. Minor text changes

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