



STN1NF20

N-channel 200 V, 1.1 Ω , 1 A SOT-223
STripFET™ II Power MOSFET

Features

Order code	V _{DSS}	R _{DS(on)} max	I _D
STN1NF20	200 V	< 1.5 Ω	1 A

- 100% avalanche tested
- Low gate charge
- Exceptional dv/dt capability

Applications

- Switching applications

Description

This Power MOSFET has been developed using STMicroelectronics' unique STripFET™ process, which is specifically designed to minimize input capacitance and gate charge. This renders the device suitable for use as primary switch in advanced high-efficiency isolated DC-DC converters for telecom and computer applications, and applications with low gate charge driving requirements.

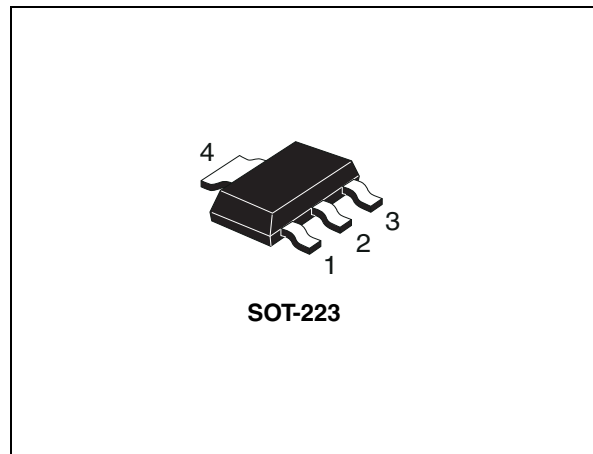


Figure 1. Internal schematic diagram

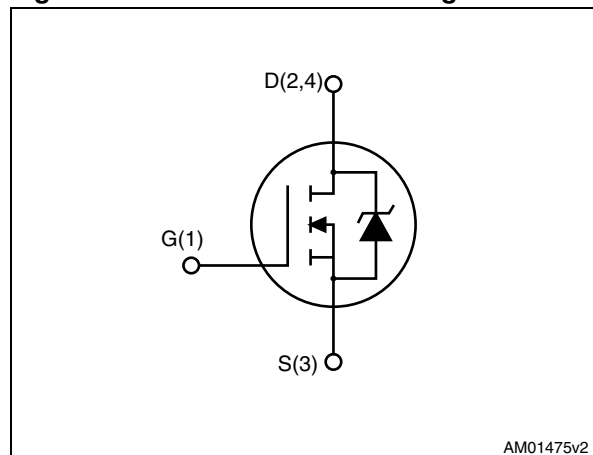


Table 1. Device summary

Order code	Marking	Package	Packaging
STN1NF20	1NF20	SOT-223	Tape and reel

Contents

1	Electrical ratings	3
2	Electrical characteristics	4
	2.1 Electrical characteristics (curves)	6
3	Test circuits	8
4	Package mechanical data	9
5	Revision history	11

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{GS}	Gate-source voltage	± 20	V
I_D	Drain current continuous $T_{amb} = 25\text{ }^\circ\text{C}$	1	A
I_D	Drain current continuous $T_{amb} = 100\text{ }^\circ\text{C}$	1	A
$I_{DM}^{(1)}$	Drain current pulsed	4	A
P_{TOT}	Total dissipation at $T_{amb} = 25\text{ }^\circ\text{C}$	2	W
$dv/dt^{(2)}$	Peak diode recovery voltage slope	10	V/ns
T_j T_{stg}	Operating junction temperature Storage temperature	-55 to 150	$^\circ\text{C}$

1. Pulse width limited by safe operating area.
2. $I_{sd} \leq 1\text{ A}$, $di/dt \leq 200\text{ A}/\mu\text{s}$, $V_{DD} \leq 80\% V_{(BR)DSS}$.

Table 3. Thermal data

Symbol	Parameter	Value	Unit
$R_{thj-amb}$	Thermal resistance junction to ambient	62.50	$^\circ\text{C}/\text{W}$

Table 4. Thermal data

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive ⁽¹⁾	1	A
E_{AS}	Single pulse avalanche energy ⁽²⁾	70	mJ

1. Pulse width limited by T_{JMAX} .
2. Starting $T_j = 25\text{ }^\circ\text{C}$, $I_D = I_{AR}$, $V_{DD} = 50\text{ V}$.

2 Electrical characteristics

(T_{case} = 25 °C unless otherwise specified)

Table 5. On /off states

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
V _{(BR)DSS}	Drain-source breakdown voltage	I _D = 1 mA, V _{GS} = 0	200			V
I _{DSS}	Zero gate voltage drain current (V _{GS} = 0)	V _{DS} = 200 V V _{DS} = 200 V, T _C =125 °C			1 50	μA μA
I _{GSS}	Gate-body leakage current	V _{GS} = ± 20 V, V _{DS} =0			±100	nA
V _{GS(th)}	Gate threshold voltage	V _{GS} = V _{DS} , I _D = 250 μA	2	3	4	V
R _{DS(on)}	Static drain-source on resistance	V _{GS} = 10 V, I _D = 0.5 A		1.1	1.5	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C _{iss}	Input capacitance	V _{DS} = 25 V, f = 1 MHz, V _{GS} = 0	-	90	-	pF
C _{oss}	Output capacitance			30		pF
C _{rss}	Reverse transfer capacitance			4		pF
R _g	Intrinsic gate resistance	f=1 MHz open drain	-	4.8	-	Ω
Q _g	Total gate charge	V _{DD} = 160 V, I _D = 1 A,	-	5.7	-	nC
Q _{gs}	Gate-source charge	V _{GS} = 10 V		1.1		nC
Q _{gd}	Gate-drain charge	(see Figure 14)		3.0		nC

Table 7. Switching times

Symbol	Parameter	Test conditions	Min.	Typ.	Max	Unit
$t_{d(v)}$	Voltage delay time	$V_{DD} = 100\text{ V}$, $I_D = 0.5\text{ A}$, $R_G = 4.7\ \Omega$, $V_{GS} = 10\text{ V}$ (see Figure 13)	-	4	-	ns
t_r	Voltage rise time			5.6		ns
t_f	Current fall time			12.4		ns
$t_{c(off)}$	Crossing time			15.8		ns

Table 8. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		1	A
$I_{SDM}^{(1)}$	Source-drain current (pulsed)				4	A
$V_{SD}^{(2)}$	Forward on voltage	$I_{SD} = 1\text{ A}$, $V_{GS} = 0$	-		1.6	V
t_{rr}	Reverse recovery time	$I_{SD} = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$ (see Figure 15)	-	51.8		ns
Q_{rr}	Reverse recovery charge			90.7		nC
I_{RRM}	Reverse recovery current			3.5		A
t_{rr}	Reverse recovery time	$I_{SD} = 1\text{ A}$, $di/dt = 100\text{ A}/\mu\text{s}$ $V_{DD} = 20\text{ V}$, $T_j = 150\text{ }^\circ\text{C}$ (see Figure 15)	-	58.0		ns
Q_{rr}	Reverse recovery charge			106.7		nC
I_{RRM}	Reverse recovery current			3.7		A

1. Pulse width limited by safe operating area
2. Pulsed: pulse duration = 300 μs , duty cycle 1.5%

2.1 Electrical characteristics (curves)

Figure 2. Safe operating area

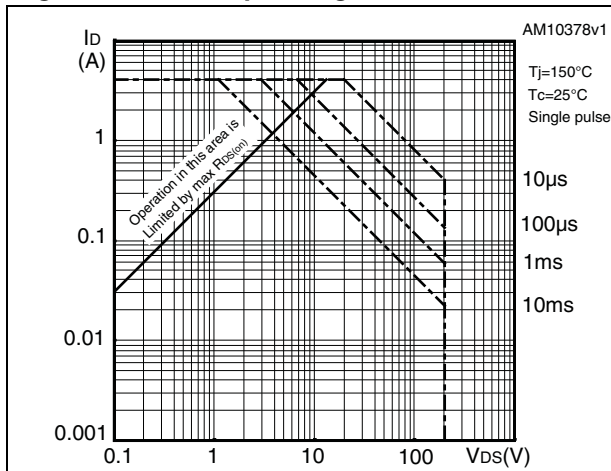


Figure 3. Thermal impedance

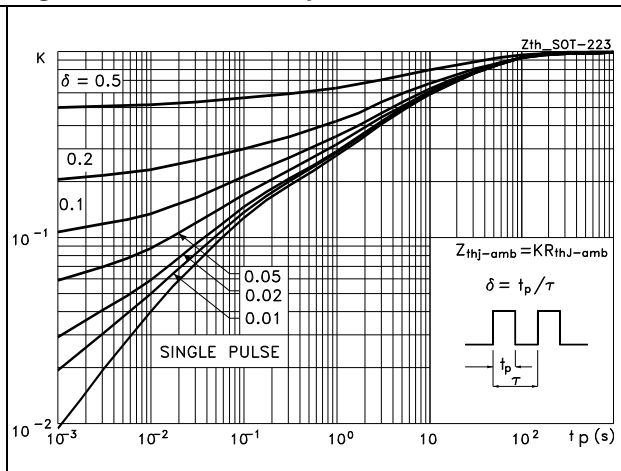


Figure 4. Output characteristics

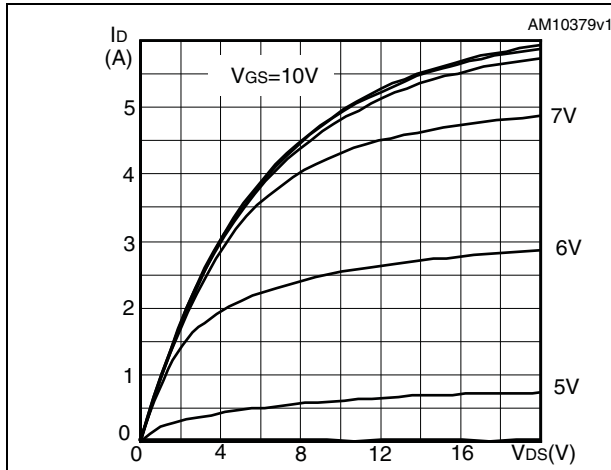


Figure 5. Transfer characteristics

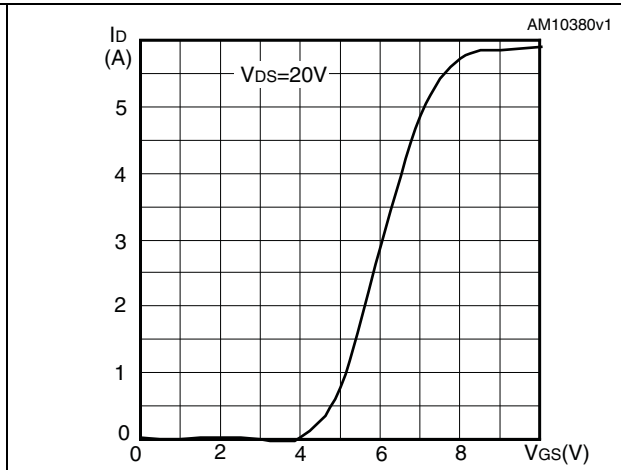


Figure 6. Normalized B_{VDSS} vs temperature

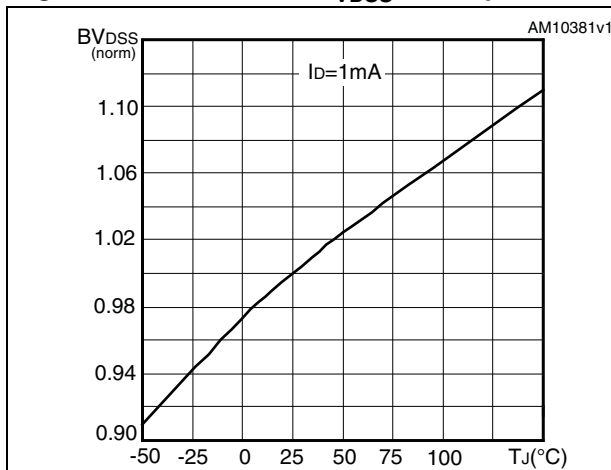


Figure 7. Static drain-source on resistance

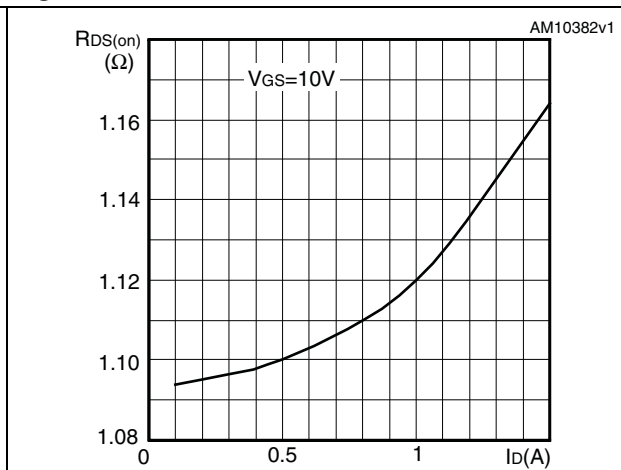


Figure 8. Gate charge vs gate-source voltage Figure 9. Capacitance variations

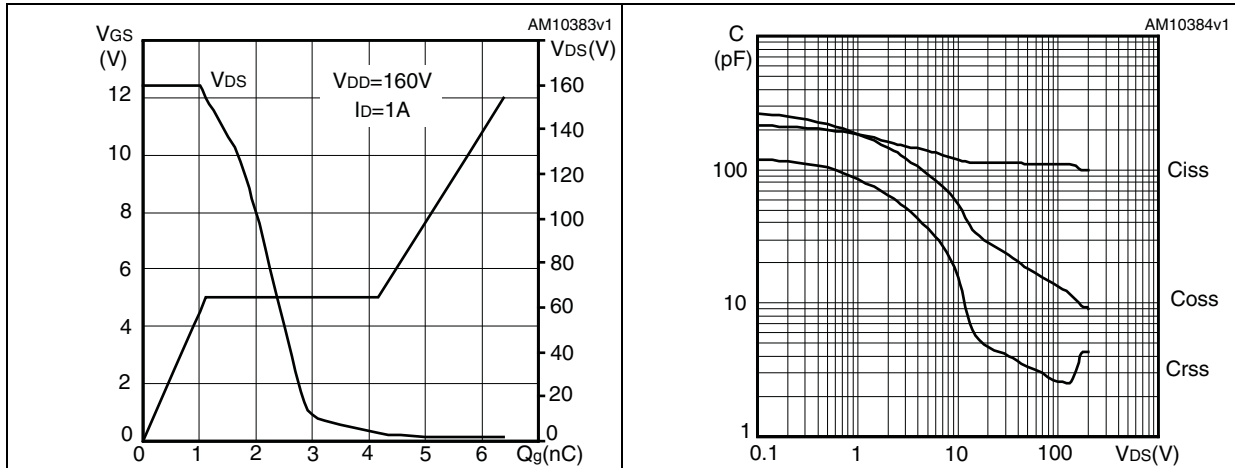


Figure 10. Normalized gate threshold voltage vs temperature Figure 11. Normalized on resistance vs temperature

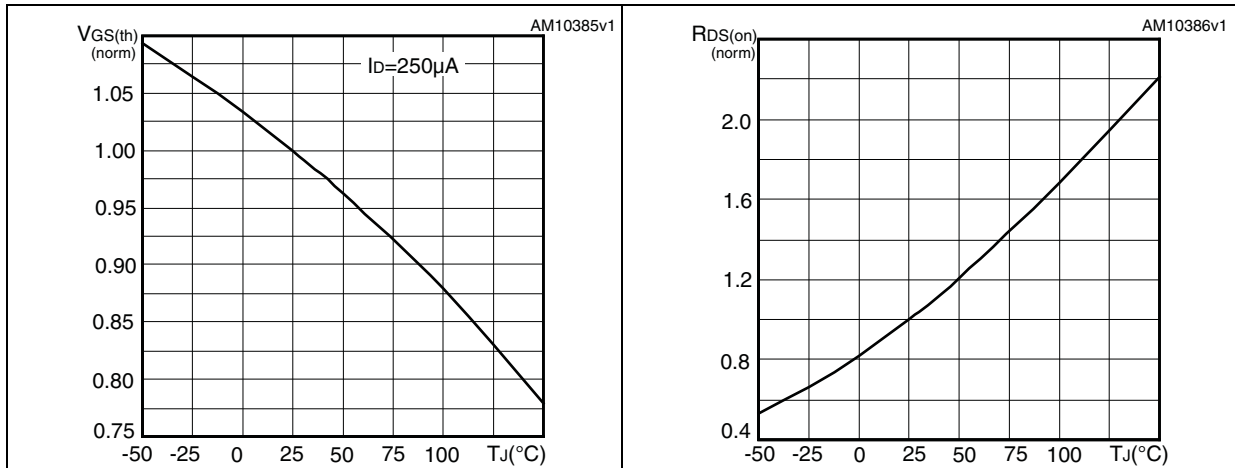
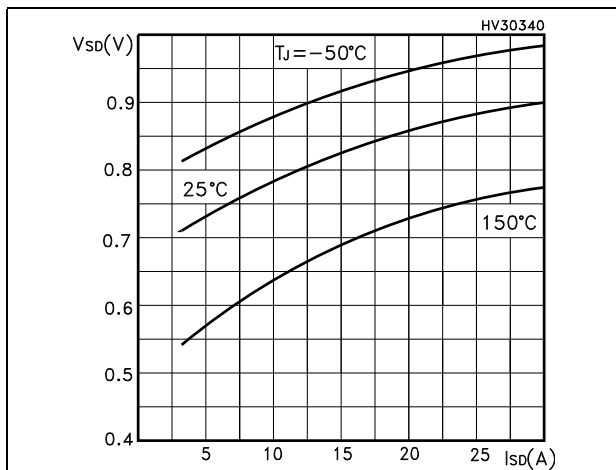


Figure 12. Source-drain diode forward characteristics



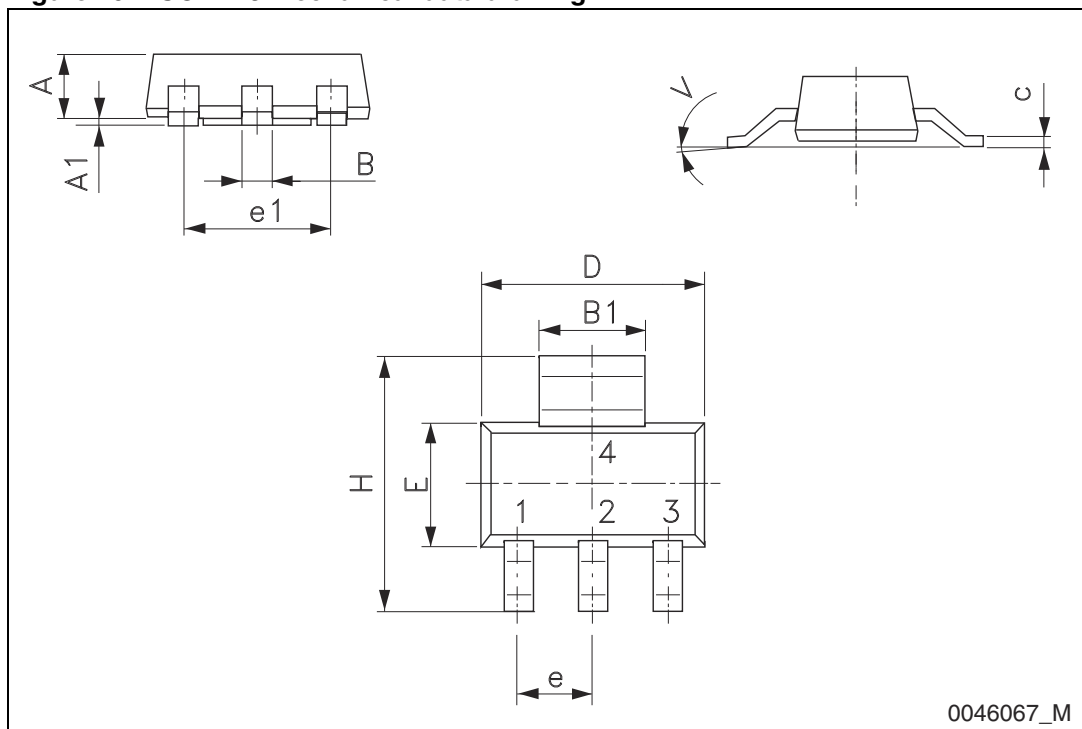
4 Package mechanical data

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.

Table 9. SOT-223 mechanical data

Dim.	mm		
	Min.	Typ.	Max.
A			1.80
A1	0.02		0.1
B	0.60	0.70	0.85
B1	2.90	3.00	3.15
c	0.24	0.26	0.35
D	6.30	6.50	6.70
e		2.30	
e1		4.60	
E	3.30	3.50	3.70
H	6.70	7.00	7.30
V			10°

Figure 19. SOT-223 mechanical data drawing



0046067_M

5 Revision history

Table 10. Document revision history

Date	Revision	Changes
04-Nov-2011	1	First release.

Please Read Carefully:

Information in this document is provided solely in connection with ST products. STMicroelectronics NV and its subsidiaries ("ST") reserve the right to make changes, corrections, modifications or improvements, to this document, and the products and services described herein at any time, without notice.

All ST products are sold pursuant to ST's terms and conditions of sale.

Purchasers are solely responsible for the choice, selection and use of the ST products and services described herein, and ST assumes no liability whatsoever relating to the choice, selection or use of the ST products and services described herein.

No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted under this document. If any part of this document refers to any third party products or services it shall not be deemed a license grant by ST for the use of such third party products or services, or any intellectual property contained therein or considered as a warranty covering the use in any manner whatsoever of such third party products or services or any intellectual property contained therein.

UNLESS OTHERWISE SET FORTH IN ST'S TERMS AND CONDITIONS OF SALE ST DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY WITH RESPECT TO THE USE AND/OR SALE OF ST PRODUCTS INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE (AND THEIR EQUIVALENTS UNDER THE LAWS OF ANY JURISDICTION), OR INFRINGEMENT OF ANY PATENT, COPYRIGHT OR OTHER INTELLECTUAL PROPERTY RIGHT.

UNLESS EXPRESSLY APPROVED IN WRITING BY TWO AUTHORIZED ST REPRESENTATIVES, ST PRODUCTS ARE NOT RECOMMENDED, AUTHORIZED OR WARRANTED FOR USE IN MILITARY, AIR CRAFT, SPACE, LIFE SAVING, OR LIFE SUSTAINING APPLICATIONS, NOR IN PRODUCTS OR SYSTEMS WHERE FAILURE OR MALFUNCTION MAY RESULT IN PERSONAL INJURY, DEATH, OR SEVERE PROPERTY OR ENVIRONMENTAL DAMAGE. ST PRODUCTS WHICH ARE NOT SPECIFIED AS "AUTOMOTIVE GRADE" MAY ONLY BE USED IN AUTOMOTIVE APPLICATIONS AT USER'S OWN RISK.

Resale of ST products with provisions different from the statements and/or technical features set forth in this document shall immediately void any warranty granted by ST for the ST product or service described herein and shall not create or extend in any manner whatsoever, any liability of ST.

ST and the ST logo are trademarks or registered trademarks of ST in various countries.

Information in this document supersedes and replaces all information previously supplied.

The ST logo is a registered trademark of STMicroelectronics. All other names are the property of their respective owners.

© 2011 STMicroelectronics - All rights reserved

STMicroelectronics group of companies

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Philippines - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States of America

www.st.com

X-ON Electronics

Largest Supplier of Electrical and Electronic Components

Click to view similar products for [MOSFET](#) category:

Click to view products by [STMicroelectronics](#) manufacturer:

Other Similar products are found below :

[614233C](#) [648584F](#) [IRFD120](#) [JANTX2N5237](#) [FCA20N60_F109](#) [FDZ595PZ](#) [2SK2545\(Q,T\)](#) [405094E](#) [423220D](#) [TPCC8103,L1Q\(CM](#)
[MIC4420CM-TR](#) [VN1206L](#) [SBVS138LT1G](#) [614234A](#) [715780A](#) [NTNS3166NZT5G](#) [SSM6J414TU,LF\(T](#) [751625C](#) [BUK954R8-60E](#)
[DMN3404LQ-7](#) [NTE6400](#) [SQJ402EP-T1-GE3](#) [2SK2614\(TE16L1,Q\)](#) [2N7002KW-FAI](#) [DMN1017UCP3-7](#) [EFC2J004NUZTDG](#) [ECH8691-](#)
[TL-W](#) [FCAB21350L1](#) [P85W28HP2F-7071](#) [DMN1053UCP4-7](#) [NTE221](#) [NTE2384](#) [NTE2903](#) [NTE2941](#) [NTE2945](#) [NTE2946](#) [NTE2960](#)
[NTE2967](#) [NTE2969](#) [NTE2976](#) [NTE455](#) [NTE6400A](#) [NTE2910](#) [NTE2916](#) [NTE2956](#) [NTE2911](#) [DMN2080UCB4-7](#) [TK10A80W,S4X\(S](#)
[SSM6P69NU,LF](#) [DMP22D4UFO-7B](#)