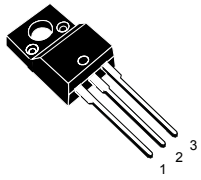
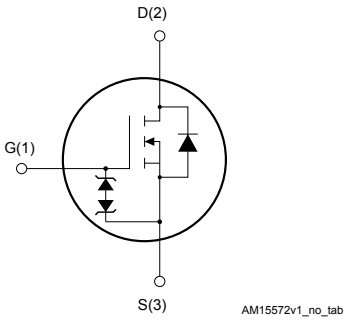
N-channel 620 V, 0.95 Ω typ., 5.5 A MDmesh K3 Power MOSFET in a TO-220FP package



TO-220FP



Features

Order code	V_{DS}	$R_{DS(on)}$ max.	I_D
STF6N62K3	620 V	1.2 Ω	5.5 A

- 100% avalanche tested
- Extremely high dv/dt capability
- Very low intrinsic capacitance
- Improved diode reverse recovery characteristics
- Zener-protected

Applications

- Switching applications

Description

This MDmesh K3 Power MOSFET is the result of improvements applied to STMicroelectronics' MDmesh technology, combined with a new optimized vertical structure. This device boasts an extremely low on-resistance, superior dynamic performance and high avalanche capability, rendering it suitable for the most demanding applications.

Product status link
STF6N62K3

Product summary	
Order code	STF6N62K3
Marking	6N62K3
Package	TO-220FP
Packing	Tube

1 Electrical ratings

Table 1. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	620	V
V_{GS}	Gate-source voltage	±30	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	5.5	A
	Drain current (continuous) at T_C = 100 °C	3	
I_{DM} (2)	Drain current (pulsed)	22	A
P_{TOT}	Total power dissipation at T_C = 25 °C	30	W
ESD	Gate-source human body model (R=1.5 kΩ, C=100 pF)	2.5	kV
dv/dt (3)	Peak diode recovery voltage slope	12	V/ns
V_{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink (t = 1 s; TC = 25 °C)	2.5	kV
T_{stg}	Storage temperature range	-55 to 150	°C
T_J	Operating junction temperature range		°C

1. *Limited by maximum junction temperature.*
2. *Pulse width limited by safe operating area.*
3. *I_{SD} ≤ 5.5 A, di/dt ≤ 400 A/µs, V_{DS} (peak) ≤ $V_{(BR)DSS}$, V_{DD} = 80% $V_{(BR)DSS}$.*

Table 2. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	4.17	°C/W
R_{thJA}	Thermal resistance, junction-to-ambient	62.5	°C/W

Table 3. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width is limited by T_J max.)	5.5	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	140	mJ

2 Electrical characteristics

Table 4. Absolute maximum ratings

Symbol	Parameter	Value	Unit
V_{DS}	Drain-source voltage	620	V
V_{GS}	Gate-source voltage	±30	V
I_D (1)	Drain current (continuous) at T_C = 25 °C	5.5	A
	Drain current (continuous) at T_C = 100 °C	3	
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1. *Limited by maximum junction temperature.*
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3. *I_{SD} ≤ 5.5 A, di/dt ≤ 400 A/µs, V_{DS} (peak) ≤ $V_{(BR)DSS}$, V_{DD} = 80% $V_{(BR)DSS}$.*

Table 5. Thermal data

Symbol	Parameter	Value	Unit
R_{thJC}	Thermal resistance, junction-to-case	4.17	°C/W
R_{thJA}	Thermal resistance, junction-to-ambient	62.5	°C/W

Table 6. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not repetitive (pulse width is limited by T_J max.)	5.5	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AR}, V_{DD} = 50 V)	140	mJ

2.1 Electrical characteristics (curves)

Figure 1. Safe operating area

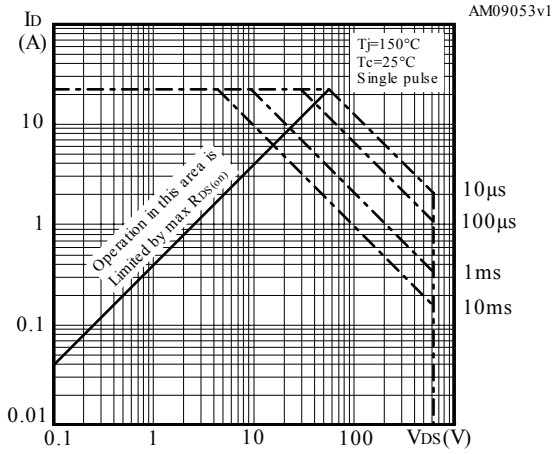


Figure 2. Normalized transient thermal impedance

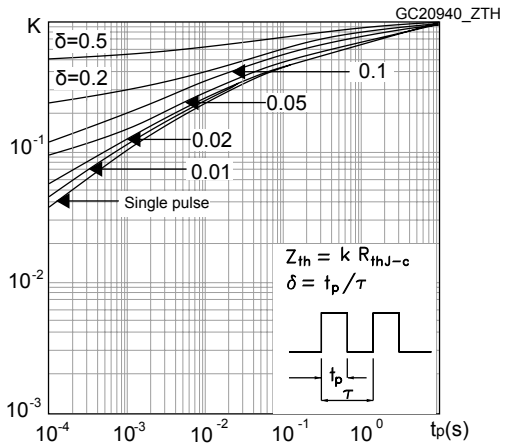


Figure 3. Typical output characteristics

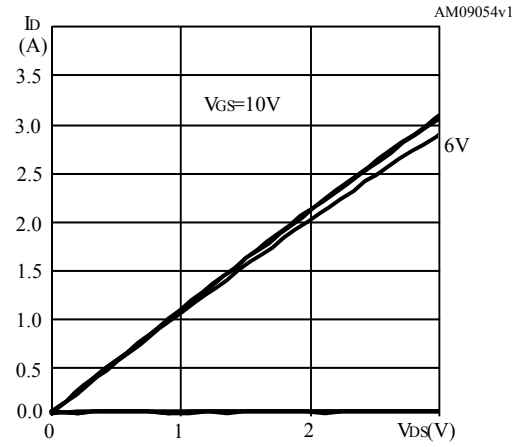


Figure 4. Typical transfer characteristics

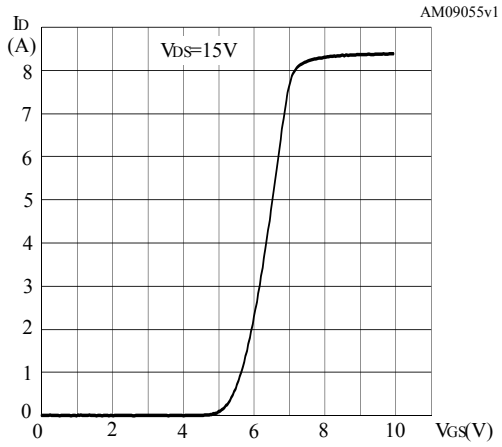


Figure 5. Typical gate charge characteristics

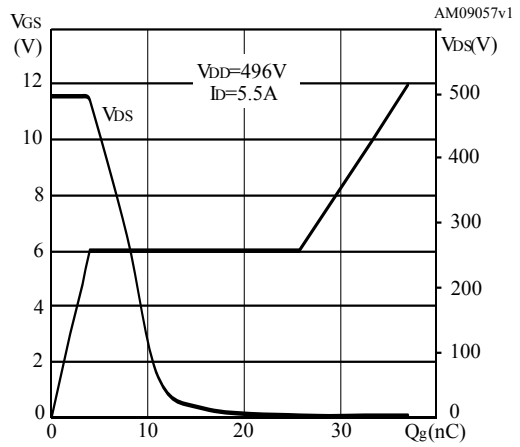


Figure 6. Typical capacitance characteristics

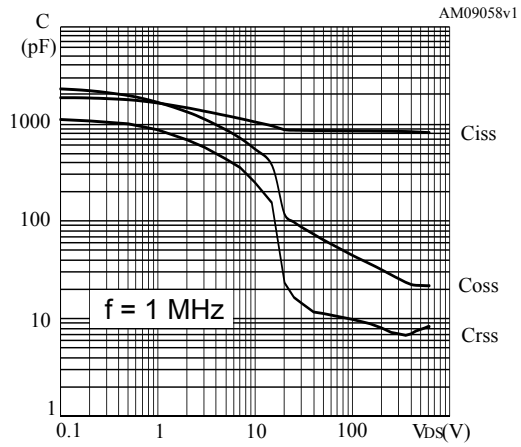


Figure 7. Normalized gate threshold vs temperature

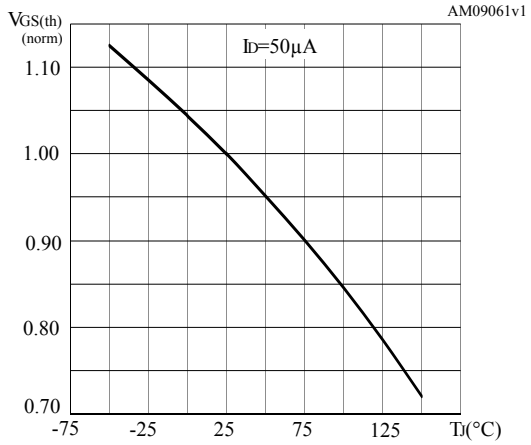


Figure 8. Normalized breakdown voltage vs temperature

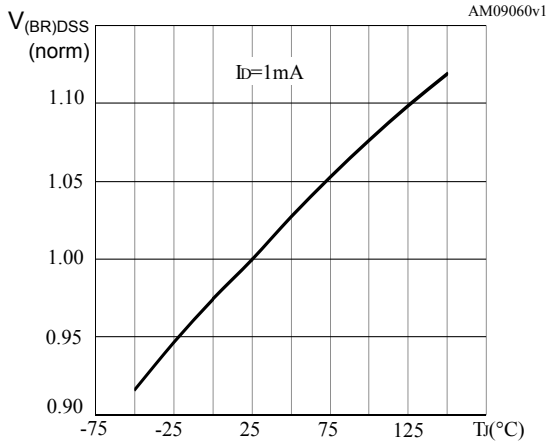


Figure 9. Typical drain-source on-resistance

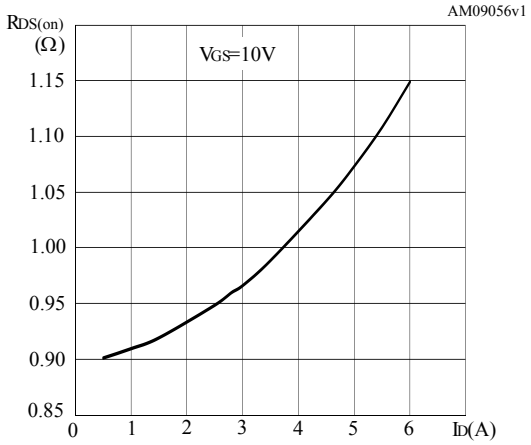


Figure 10. Normalized on-resistance vs temperature

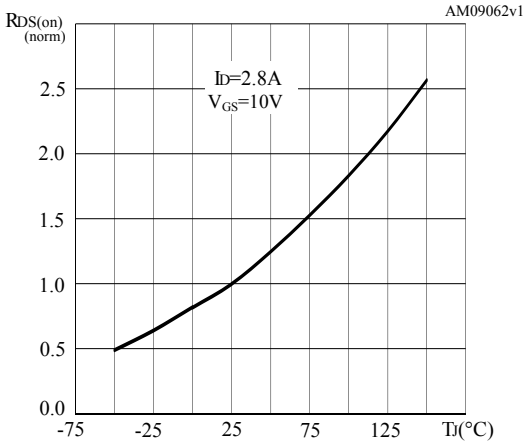


Figure 11. Typical output capacitance stored energy

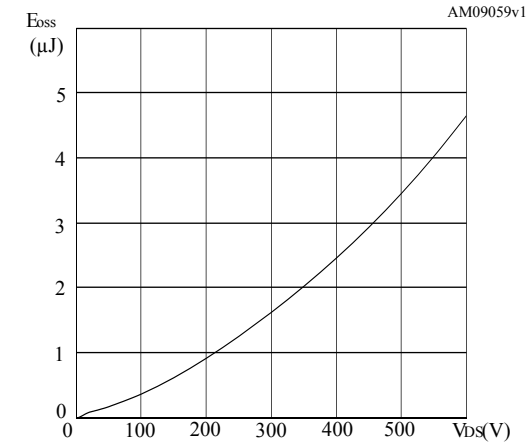


Figure 12. Typical reverse diode forward characteristics

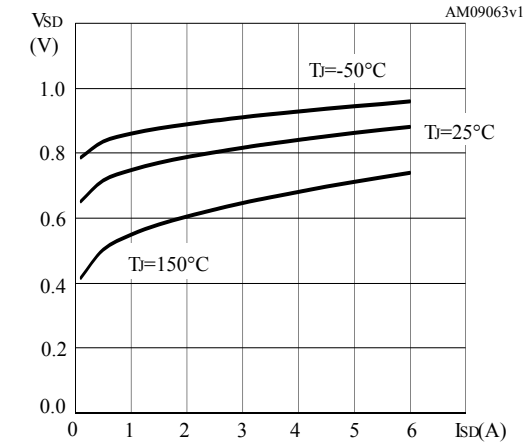
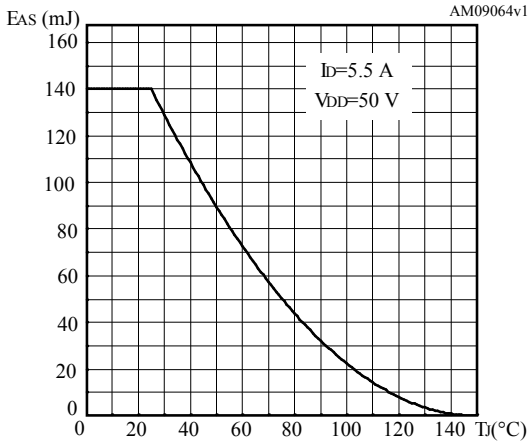
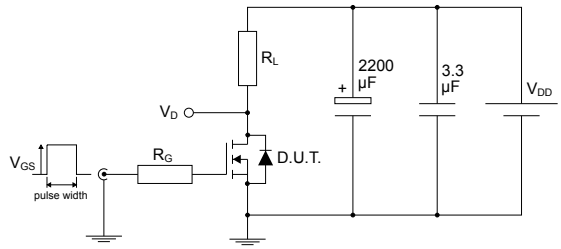


Figure 13. Maximum avalanche energy vs temperature



3 Test circuits

Figure 14. Test circuit for resistive load switching times



AM01468v1

Figure 15. Test circuit for gate charge behavior

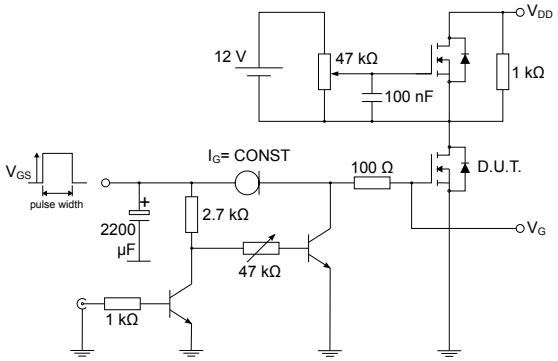


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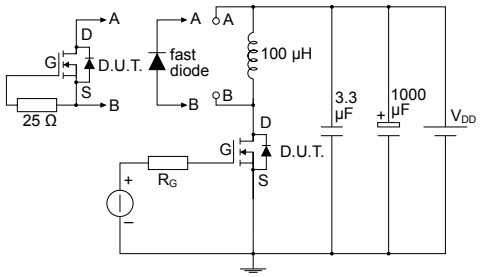
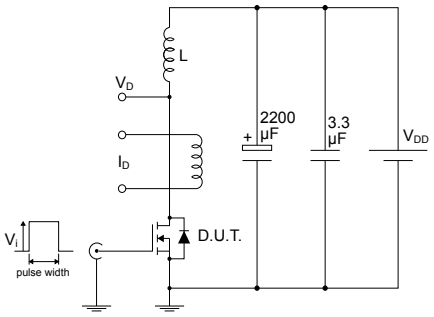
Figure 16. Test circuit for inductive load switching and diode recovery times



AM01470v1

Figure 17. Unclamped inductive load test circuit



AM01471v1

Figure 18. Unclamped inductive waveform

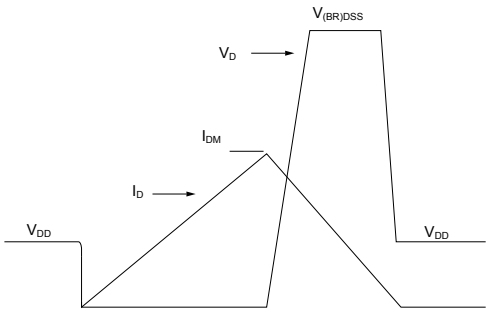


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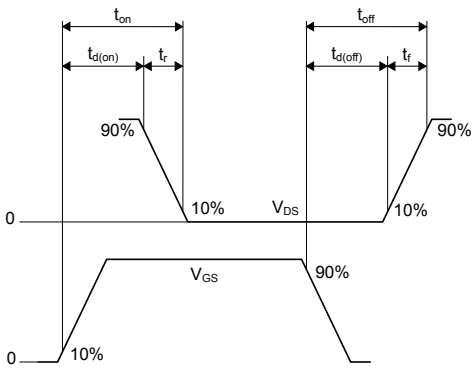
Figure 19. Switching time waveform



AM01473v1

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-220FP type B package information

Figure 20. TO-220FP type B package outline

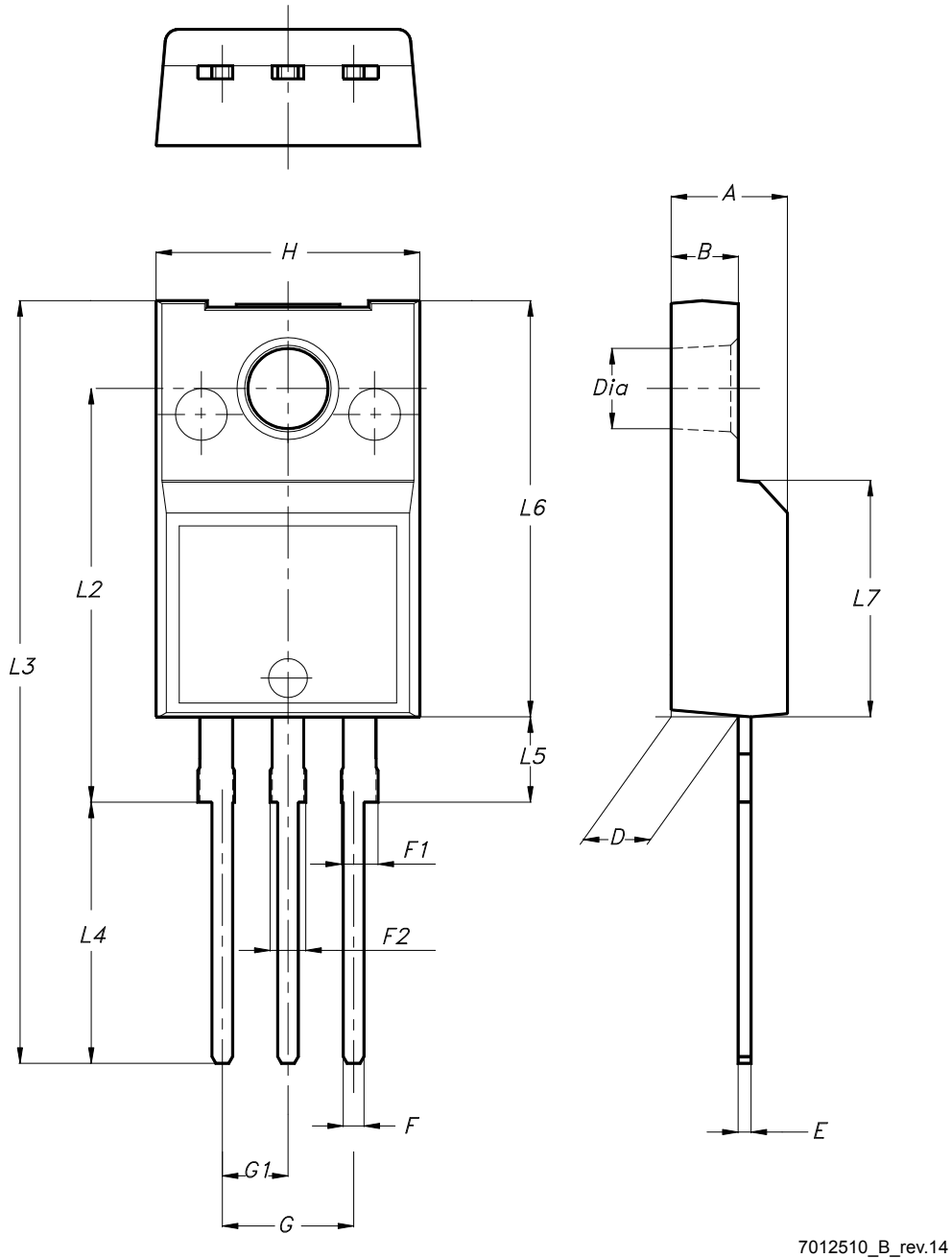


Table 7. **TO-220FP type B package mechanical data**

Dim.	mm		
	Min.	Typ.	Max.
A	4.40		4.60
B	2.50		2.70
D	2.50		2.75
E	0.45		0.70
F	0.75		1.00
F1	1.15		1.70
F2	1.15		1.70
G	4.95		5.20
G1	2.40		2.70
H	10.00		10.40
L2		16.00	
L3	28.60		30.60
L4	9.80		10.60
L5	2.90		3.60
L6	15.90		16.40
L7	9.00		9.30
Dia	3.00		3.20

Revision history

Table 8. **Document revision history**

Date	Revision	Changes
17-Oct-2023	1	First release. Part number STF6N62K3 previously included in datasheet DS5818.

Contents