STB26NM60ND, STF26NM60ND, STP26NM60ND, STW26NM60ND

N-channel 600 V, 0.145 Ω typ., 21 A, FDmesh™ II Power MOSFETs in D²PAK, TO-220FP, TO-220 and TO-247 packages

Datasheet - production data

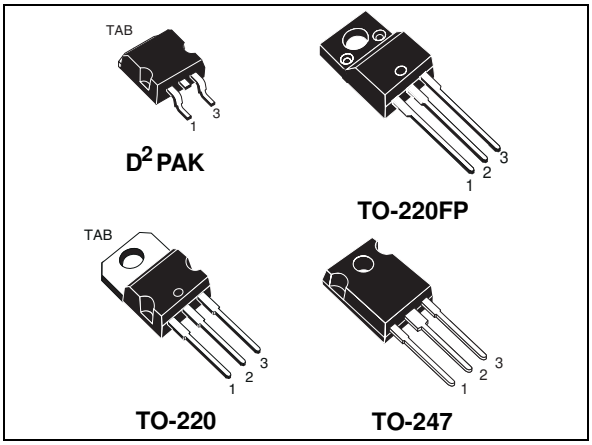
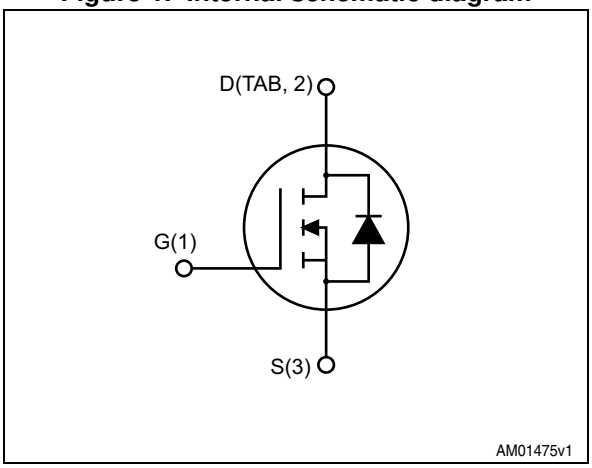


Figure 1. Internal schematic diagram



Features

Order codes	V_{DS} @ T_{jmax}	$R_{DS(on)}$ max	I_D
STB26NM60ND	650 V	0.175	21 A
STF26NM60ND			
STP26NM60ND			
STW26NM60ND			

- 100% avalanche tested
- Low input capacitance and gate charge
- Low gate input resistance
- Extremely high dv/dt and avalanche capabilities

Applications

- Switching applications

Description

These FDmesh™ II Power MOSFETs with intrinsic fast-recovery body diode are produced using the second generation of MDmesh™ technology. Utilizing a new strip-layout vertical structure, these revolutionary devices feature extremely low on-resistance and superior switching performance. They are ideal for bridge topologies and ZVS phase-shift converters.

Table 1. Device summary

Order codes	Marking	Packages	Packaging
STB26NM60ND	26NM60ND	D²PAK	Tape and reel
STF26NM60ND		TO-220FP	Tube
STP26NM60ND		TO-220	
STW26NM60ND		TO-247	

1 Electrical ratings

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		D^2PAK, TO-220, TO-247	TO-220FP	
V_{DS}	Drain-source voltage	600		V
V_{GS}	Gate-source voltage	±25		V
I_D	Drain current (continuous) at T_C = 25 °C	21	21(1)	A
I_D	Drain current (continuous) at T_C = 100 °C	13	13(1)	A
I_{DM} (2)	Drain current (pulsed)	84	84(1)	A
P_{TOT}	Total dissipation at T_C = 25 °C	190	35	W
dv/dt(3)	Peak diode recovery voltage slope	40		V/ns
dv/dt(4)	MOSFET dv/dt ruggedness	40		V/ns
V_{ISO}	Insulation withstand voltage (RMS) from all three leads to external heat sink (t=1 s;T_C=25 °C)		2500	V
T_{stg}	Storage temperature	–55 to 150		°C
T_J	Max. operating junction temperature	150		°C

1. Limited only by maximum temperature allowed
2. Pulse width limited by safe operating area
3. $I_{SD} \leq 21$ A, di/dt ≤ 400 A/µs, V_{DD} = 80% $V_{(BR)DSS}$
4. $V_{DS} \leq 480$ V

Table 3. Thermal data

Symbol	Parameter	Value				Unit
		D^2PAK	TO-220FP	TO-220	TO-247	
$R_{thj\text{-}case}$	Thermal resistance junction-case max	0.66	3.57	0.66		°C/W
$R_{thj\text{-}amb}$	Thermal resistance junction-ambient max		62.5		50	°C/W
$R_{thj\text{-}pcb}$(1)	Thermal resistance junction-pcb max	30				°C/W

1. When mounted on 1inch² FR-4 board, 2 oz Cu

Table 4. Avalanche characteristics

Symbol	Parameter	Value	Unit
I_{AR}	Avalanche current, repetitive or not-repetitive (pulse width limited by T_J max)	4	A
E_{AS}	Single pulse avalanche energy (starting T_J = 25 °C, I_D = I_{AS}, V_{DD} = 50 V)	100	mJ

2 Electrical characteristics

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

Table 5. On/off states

Symbol	Parameter	Test conditions	Value			Unit
			Min.	Typ.	Max.	
$V_{(BR)DSS}$	Drain-source breakdown voltage	I_D = 1 mA, V_{GS} = 0	600			V
I_{DSS}	Zero gate voltage drain current (V_{GS} = 0)	V_{DS} = 600 V V_{DS} = 600 V @T_C= 125 °C			1 100	µA µA
I_{GSS}	Gate-body leakage current (V_{DS} = 0)	V_{GS} = ± 25 V			±100	nA
$V_{GS(th)}$	Gate threshold voltage	V_{DS} = V_{GS}, I_D = 250 µA	3	4	5	V
$R_{DS(on)}$	Static drain-source on- resistance	V_{GS} = 10 V, I_D = 10.5 A		0.145	0.175	Ω

Table 6. Dynamic

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
C_{iss}	Input capacitance	V_{DS} = 100 V, f = 1 MHz, V_{GS} = 0	-	1817	-	pF
C_{oss}	Output capacitance		-	90	-	pF
C_{rss}	Reverse transfer capacitance		-	4.4	-	pF
$C_{oss\ eq.}$ (1)	Equivalent output capacitance	V_{GS} = 0, V_{DS} = 0 to 480 V	-	270	-	pF
$t_{d(on)}$	Turn-on delay time	V_{DD} = 300 V, I_D = 10.5 A R_G = 4.7 Ω V_{GS} = 10 V	-	22	-	ns
t_r	Rise time		-	14.5	-	ns
$t_{d(off)}$	Turn-off delay time		-	69	-	ns
t_f	Fall time		-	27.5	-	ns
Q_g	Total gate charge	V_{DD} = 480 V, I_D = 21 A, V = 10 V,	-	54.6	-	nC
Q_{gs}	Gate-source charge		-	9.1	-	nC
Q_{gd}	Gate-drain charge		-	32.5	-	nC
R_g	Intrinsic gate resistance	f = 1 MHz, I_D = 0	-	2.5	-	Ω

1. $C_{oss\ eq.}$ is defined as a constant equivalent capacitance giving the same charging time as C_{oss} when V_{DS} increases from 0 to 80% V_{DSS}

Table 7. Source drain diode

Symbol	Parameter	Test conditions	Min.	Typ.	Max.	Unit
I_{SD}	Source-drain current		-		21	A
I_{SDM} (1)	Source-drain current (pulsed)		-		84	A
V_{SD} (2)	Forward on voltage	I_{SD} = 21 A, V_{GS} = 0	-		1.6	V
t_{rr}	Reverse recovery time	I_{SD} = 21 A, V_{DD} = 60 V di/dt=100 A/µs	-	170		ns
Q_{rr}	Reverse recovery charge		-	1.39		µC
I_{RRM}	Reverse recovery current		-	14		A
t_{rr}	Reverse recovery time	I_{SD} = 21 A,V_{DD} = 60 V di/dt=100 A/µs, T_J = 150 °C	-	230		ns
Q_{rr}	Reverse recovery charge		-	2.24		µC
I_{RRM}	Reverse recovery current		-	18		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 for D²PAK and TO-220

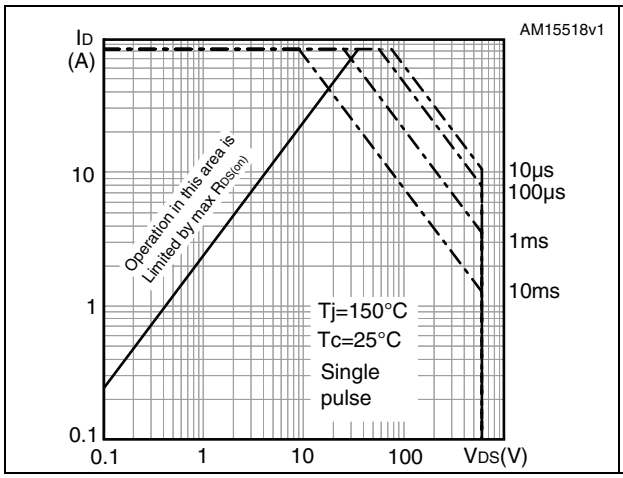


Figure 3. Thermal impedance for D²PAK and TO-220

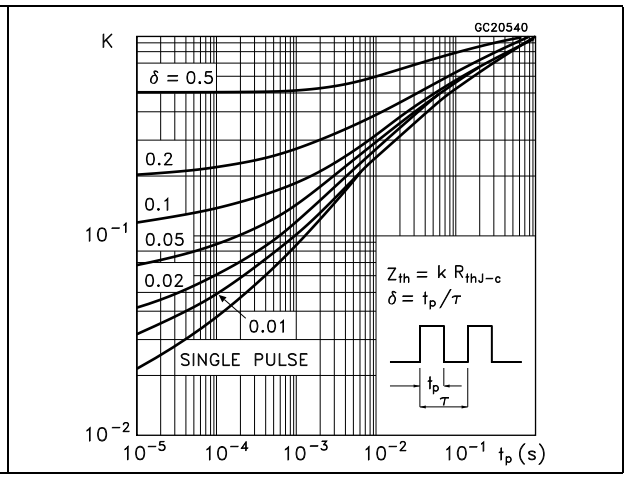


Figure 4. Safe operating area for TO-220FP

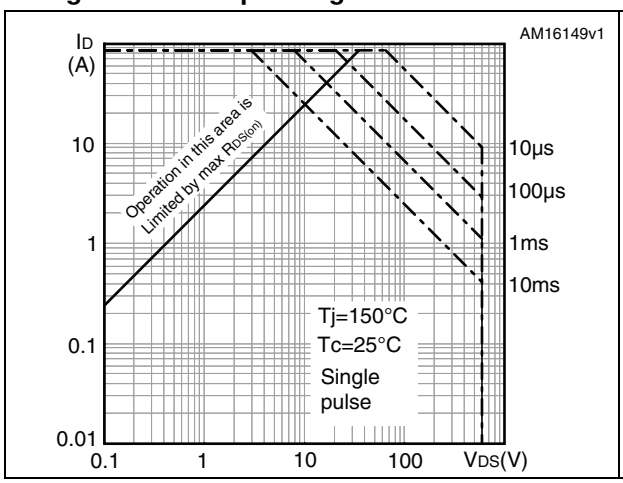


Figure 5. Thermal impedance for TO-220FP

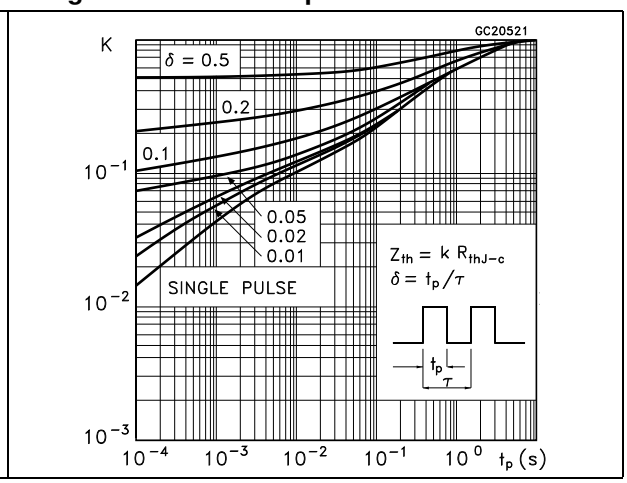


Figure 6. Safe operating area for TO-247

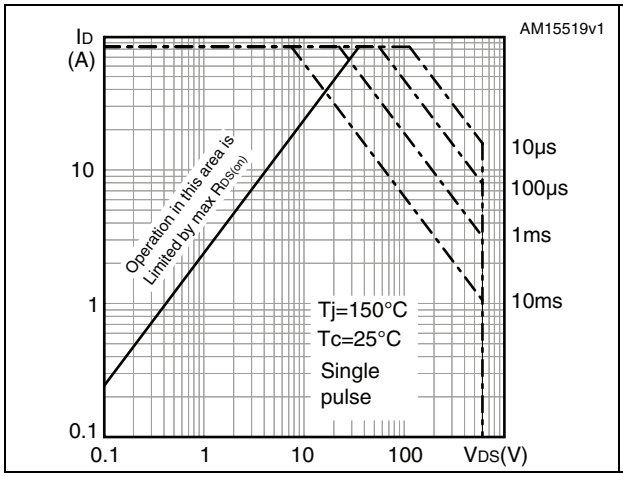


Figure 7. Thermal impedance for TO-247