VND5N07/VND5N07-1
VNP5N07FI/K5N07FM

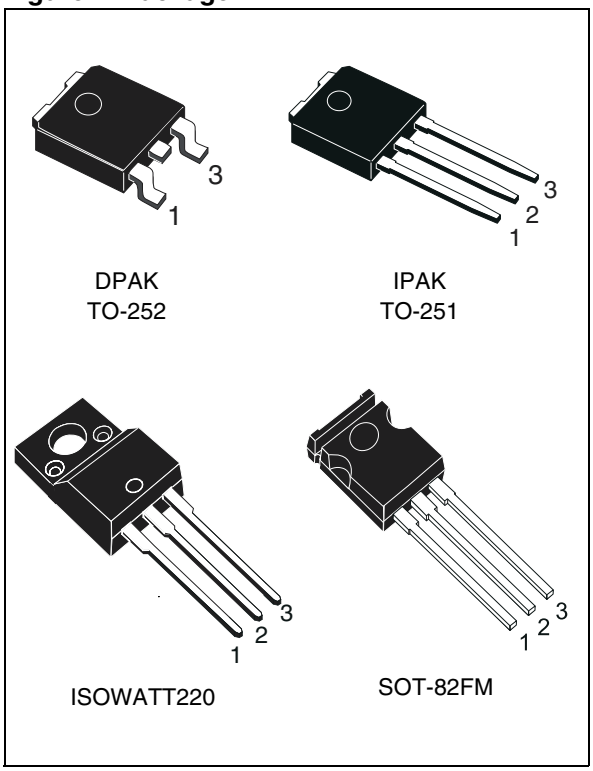
"OMNIFET":
FULLY AUTOPROTECTED POWER MOSFET

Table 1. General Features

Type	V_{clamp}	$R_{DS(on)}$	I_{lim}
VND5N07 VND5N07-1 VND5N07FI VND5N07FM	70 V	0.2 Ω	5 A

- LINEAR CURRENT LIMITATION
- THERMAL SHUT DOWN
- SHORT CIRCUIT PROTECTION
- INTEGRATED CLAMP
- LOW CURRENT DRAWN FROM INPUT PIN
- DIAGNOSTIC FEEDBACK THROUGH INPUT PIN
- ESD PROTECTION
- DIRECT ACCESS TO THE GATE OF THE POWER MOSFET (ANALOG DRIVING)
- COMPATIBLE WITH STANDARD POWER MOSFET

Figure 1. Package



DESCRIPTION

The VND5N07, VND5N07-1, VNP5N07FI and VNK5N07FM are monolithic devices made using STMicroelectronics VIPower M0 Technology, intended for replacement of standard power MOSFETS in DC to 50 KHz applications. Built-in thermal shut-down, linear current limitation and overvoltage clamp protect the chip in harsh enviroments.

Fault feedback can be detected by monitoring the voltage at the input pin.

Table 2. Order Codes

Package	Tube	Tape and Reel
DPAK	VND5N07	VND5N0713TR
IPAK	VND5N07-1	–
ISOWATT220	VND5N07FI	–
SOT-82FM	VND5N07FM	–

Figure 2. Block Diagram

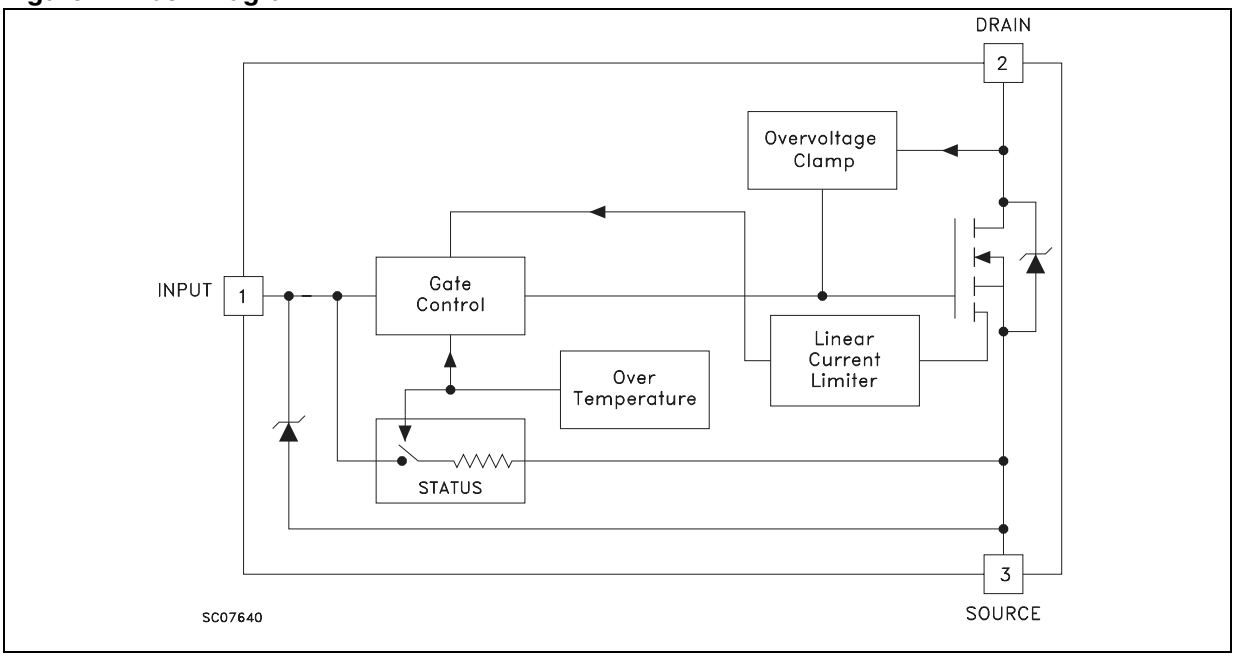


Table 3. Absolute Maximum Ratings

Symbol	Parameter	Value			Unit
		DPAK IPAK	ISOWATT220	SOT-82FM	
V_{DS}	Drain-Source Voltage (V_{in} = 0)	Internally Clamped			V
V_{in}	Input Voltage	18			V
I_D	Drain Current	Internally Limited			A
I_R	Reverse DC Output Current	–7			A
V_{esd}	Electrostatic Discharge (C = 100 pF, R =1.5 KΩ)	2000			V
P_{tot}	Total Dissipation at T_c = 25 °C	60	24	9	W
T_j	Operating Junction Temperature	Internally Limited			°C
T_c	Case Operating Temperature	Internally Limited			°C
T_{stg}	Storage Temperature	-55 to 150			°C

Table 4. Thermal Data

Symbol	Parameter		DPAK/IPAK	ISOWATT220	SOT-82FM	Unit
$R_{thj\text{-}case}$	Thermal Resistance Junction-case	Max	3.75	5.2	14	°C/W
$R_{thj\text{-}amb}$	Thermal Resistance Junction-ambient	Max	100	62.5	100	°C/W

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

Table 5. Off

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{CLAMP}	Drain-source Clamp Voltage	I_D = 200 mA; V_{in} = 0	60	70	80	V
V_{CLTH}	Drain-source Threshold Voltage	I_D = 2 mA; V_{in} = 0	55			V
V_{INCL}	Input-Source Reverse Clamp Voltage	I_{in} = –1 mA	–1		–0.3	V
I_{DSS}	Zero Input Voltage Drain Current (V_{in} = 0)	V_{DS} = 13 V; V_{in} = 0 V_{DS} = 25 V; V_{in} = 0			50 200	µA µA
I_{ISS}	Supply Current from Input Pin	V_{DS} = 0 V; V_{in} = 10 V		250	500	µA

Table 6. On (1)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$V_{IN(th)}$	Input Threshold Voltage	V_{DS} = V_{in}; I_D + I_{in} = 1 mA	0.8		3	V
$R_{DS(on)}$	Static Drain-source On Resistance	V_{in} = 10 V; I_D = 2.5 A V_{in} = 5 V; I_D = 2.5 A			0.200 0.280	Ω Ω

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

Table 7. Dynamic

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
g_{fs} (2)	Forward Transconductance	V_{DS} = 13 V; I_D = 2.5 A	3	4		S
C_{oss}	Output Capacitance	V_{DS} = 13 V; f = 1 MHz; V_{in} = 0		200	300	pF

Note: 2. Pulsed: Pulse duration = 300 µs, duty cycle 1.5%.

Table 8. Switching (3)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 15 V; I_d = 2.5 A;		50	100	ns
t_r	Rise Time	V_{gen} = 10V; R_{gen} = 10 Ω		60	100	ns
$t_{d(off)}$	Turn-off Delay Time	(see Figure 28)		150	300	ns
t_f	Fall Time			40	80	ns
$t_{d(on)}$	Turn-on Delay Time	V_{DD} = 15 V; I_d = 2.5 A;		150	250	ns
t_r	Rise Time	V_{gen} = 10V; R_{gen} = 1000 Ω		400	600	ns
$t_{d(off)}$	Turn-off Delay Time	(see Figure 28)		3900	5000	ns
t_f	Fall Time			1100	1600	ns
$(di/dt)_{on}$	Turn-on Current Slope	V_{DD} = 15 V; I_D = 2.5 A V_{in} = 10 V; R_{gen} = 10 Ω		80		A/µS
Q_i	Total Input Charge	V_{DD} = 12 V; I_D = 2.5 A; V_{in} = 10 V		18		nC

Note: 3. Parameters guaranteed by design/characterization.

ELECTRICAL CHARACTERISTICS (cont'd)

Table 9. Source Drain Diode

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V_{SD}(4)	Forward On Voltage	I_{SD} = 2.5 A; V_{in} = 0			1.6	V
t_{rr}(5)	Reverse Recovery Time	I_{SD} = 2.5 A; di/dt = 100 A/µs V_{DD} = 30 V; T_j = 25 °C (see test circuit, Figure 30)		150		ns
Q_{rr}(5)	Reverse Recovery Charge			0.3		µC
I_{RRM}(5)	Reverse Recovery Current			5.7		A

Note: 4. Pulsed: Pulse duration = 300 µs, duty cycle 1.5%
5. Parameters guaranteed by design/characterization.

Table 10. Protection

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
I_{lim}	Drain Current Limit	V_{in} = 10 V; V_{DS} = 13 V V_{in} = 5 V; V_{DS} = 13 V	3.5 3.5	5 5	7 7	A A
t_{dlim}(6)	Step Response Current Limit	V_{in} = 10 V V_{in} = 5 V		15 40	20 60	µs µs
T_{jsh}(6)	Overtemperature Shutdown		150			°C
T_{jrs}(6)	Overtemperature Reset		135			°C
I_{gf}(6)	Fault Sink Current	V_{in} = 10 V; V_{DS} = 13 V V_{in} = 5 V; V_{DS} = 13 V		50 20		mA mA
E_{as}(6)	Single Pulse Avalanche Energy	starting T_j = 25 °C; V_{DD} = 20 V V_{in} = 10 V; R_{gen} = 1 KΩ; L = 10 mH	0.2			J

Note: 6. Parameters guaranteed by design/characterization.