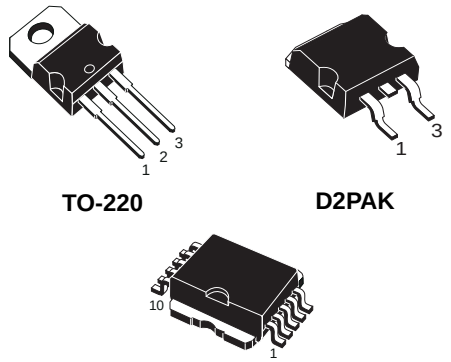
VNP35N07-E, VNB35N07-E, VNV35N07-E

OMNIFET: fully autoprotected Power MOSFET

Datasheet - production data



Features

Type	V_{clamp}	$R_{DS(on)}$	I_{lim}
VNP35N07-E	70 V	0.028 Ω	35 A
VNB35N07-E	70 V	0.028 Ω	35 A
VNV35N07-E	70 V	0.028 Ω	35 A

- Automotive qualified
- Linear current limitation
- Thermal shutdown
- 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
- Standard TO-220 package
- Compliant with 2002/95/EC European directive

Description

The VNP35N07-E, VNB35N07-E and VNV35N07-E are monolithic devices made using STMicroelectronics VIPower® technology, intended for replacement of standard Power MOSFETs in DC to 50 KHz applications.

Built-in thermal shutdown, linear current limitation and overvoltage clamp protect the chip in harsh environments.

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

Table 1. Device summary

Package	Order codes	
	Tube	Tape and reel
TO-220	VNP35N07-E	VNP35N07TR-E
D^2PAK	VNB35N07-E	VNB35N07TR-E
PowerSO-10	VNV35N07-E	VNV35N07TR-E

2 Electrical specification

2.1 Absolute maximum rating

Table 2. Absolute maximum ratings

Symbol	Parameter	Value		Unit
		D^2PAK PowerSO-10	TO-220	
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	-50		A
V_{esd}	Electrostatic Discharge (C = 100 pF; R = 1.5 KΩ)	2000		V
P_{tot}	Total dissipation at T_C = 25°C	125	40	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

2.2 Thermal data

Table 3. Thermal data

Symbol	Parameter	Value			Unit
		PowerSO-10	D^2PAK	TO-220	
$R_{thj-case}$	Thermal Resistance Junction-case (max)	1	1	3.12	°C/W
$R_{thj-amb}$	Thermal Resistance Junction-ambient (max)	50	62.5	62.5	°C/W

2.3 Electrical characteristics

T_{case} = 25°C unless otherwise specified.

Table 4. Off

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{CLAMP}	Drain-source clamp voltage	I_D = 200 mA; V_{in} = 0 V	60	70	80	V
V_{CLTH}	Drain-source clamp threshold voltage	I_D = 2 mA; V_{in} = 0 V	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)	V_{DS} = 13 V; V_{in} = 0 V			50	mA
		V_{DS} = 25 V; V_{in} = 0 V			200	µA
I_{ISS}	Supply current from input pin	V_{DS} = 0 V; V_{in} = 10 V		250	500	µA

Table 5. On

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$V_{IN(th)}$(1)	Input threshold voltage	V_{DS} = V_{in}; $I_{D+}I_{in}$ = 1 mA	0.8	—	3	V
$R_{DS(on)}$(1)	Static drain-source on resistance	V_{in} = 10 V; I_D = 18 A		—	0.028	Ω
		V_{in} = 5 V; I_D = 18 A		—	0.035	Ω

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

Table 6. Dynamic

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
g_{fs}(1)	Forward transconductance	V_{DS} = 13 V; I_D = 18 A	20	25		S
C_{OSS}	Output capacitance	V_{DS} = 13 V; f = 1 MHz; V_{in} = 0 V		980	1400	pF

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

Table 7. Switching

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$t_{d(on)}$(1)	Turn-on delay time	V_{DD} = 28 V; I_d = 18 A; V = 10 V; R_{gen} = 10 Ω	—	100	200	ns
t_r(1)	Rise time		—	350	600	ns
$t_{d(off)}$(1)	Turn-off delay time		—	650	1000	ns
t_f(1)	Fall time		—	200	350	ns
$t_{d(on)}$(1)	Turn-on delay time	V_{DD} = 28 V; I_d = 18 A; V_{gen} = 10 V; R_{gen} = 1000 Ω	—	500	800	µs
t_r(1)	Rise time		—	2.7	4.2	µs
$t_{d(off)}$(1)	Turn-off delay time		—	10	16	µs
t_f(1)	Fall time		—	4.3	6.5	µs

Table 7. Switching (continued)

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
$(di/dt)_{on}$ (1)	Turn-on current slope	V_{DD} = 28 V; I_D = 18 A; V_{in} = 10 V; R_{gen} = 10 Ω	—	60		A/µs
Q_i (1)	Total input charge	V_{DD} = 12 V; I_D = 18 A; V_{in} = 10 V	—	100		nC

1. Parameters guaranteed by design/characterization.

Table 8. Source drain diode

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
V_{SD} (1)	Forward on voltage	I_{SD} = 18 A; V_{in} = 0 V	—		1.6	V
t_{rr} (2)	Reverse recovery time	I_{SD} = 18 A; di/dt = 100 A/µs; V_{DD} = 30 V; T_J = 25 °C	—	250		ns
Q_{rr} (2)	Reverse recovery charge		—	1		µC
I_{RRM} (2)	Reverse recovery current		—	8		A

1. Pulsed: Pulse duration = 300 ms, duty cycle 1.5%.
2. Parameters guaranteed by design/characterization.

Table 9. Protection

Symbol	Parameter	Test Conditions	Min	Typ	Max	Unit
I_{lim}	Drain current limit	V_{IN} = 10 V; V_{DS} = 13 V	25	35	45	A
		V_{IN} = 5 V; V_{DS} = 13 V	25	35	45	A
t_{dlim} (1)	Step response current limit	V_{in} = 10 V		35	60	µs
		V_{in} = 5 V		70	140	µs
T_{jsh} (1)	Overtemperature shutdown		150			°C
T_{jrs} (1)	Overtemperature reset		135			°C
I_{gf} (1)	Fault sink current	V_{IN} = 10 V; V_{DS} = 13 V		50		mA
		V_{IN} = 5 V; V_{DS} = 13 V		20		mA
E_{as} (1)	Single pulse avalanche energy	Starting T_j = 25 °C; V_{DD} = 20 V; V_{in} = 10 V; R_{gen} = 1 KΩ; L = 10 mH	2.5			J

1. Parameters guaranteed by design/characterization.