

## SIPMOS® Power-Transistor

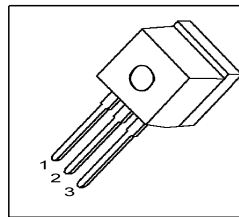
### Feature

- N-Channel
- Enhancement mode
- 175°C operating temperature
- Avalanche rated
- dv/dt rated

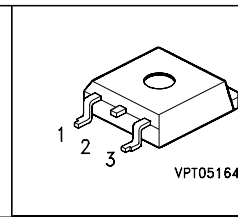
### Product Summary

$V_{DS}$	100	V
$R_{DS(on)}$	85	mΩ
$I_D$	21	A

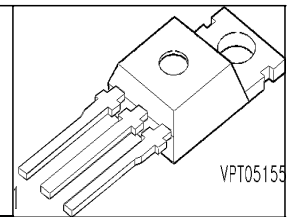
P-TO262-3-1



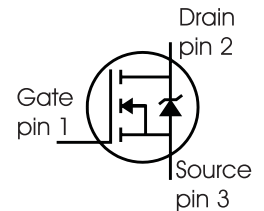
P-TO263-3-2



P-TO220-3-1



Type	Package	Ordering Code	Marking
SPP21N10	P-TO220-3-1	-	21N10
SPB21N10	P-TO263-3-2	-	21N10
SPI21N10	P-TO262-3-1	-	21N10



### Maximum Ratings, at $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current $T_C=25^\circ\text{C}$ $T_C=100^\circ\text{C}$	$I_D$	21 -	A
Pulsed drain current $T_C=25^\circ\text{C}$	$I_{D \text{ puls}}$	84	
Avalanche energy, single pulse $I_D=21 \text{ A}$ , $V_{DD}=25\text{V}$ , $R_{GS}=25\Omega$	$E_{AS}$	130	mJ
Reverse diode dv/dt $I_S=21\text{A}$ , $V_{DS}=80\text{V}$ , $dI/dt=200\text{A}/\mu\text{s}$ , $T_{j\text{max}}=175^\circ\text{C}$	dv/dt	6	kV/ $\mu\text{s}$
Gate source voltage	$V_{GS}$	$\pm 20$	V
Power dissipation $T_C=25^\circ\text{C}$	$P_{\text{tot}}$	104	W
Operating and storage temperature	$T_j, T_{\text{stg}}$	-55... +175	$^\circ\text{C}$
IEC climatic category; DIN IEC 68-1		55/175/56	

**Thermal Characteristics**

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Thermal resistance, junction - case	$R_{thJC}$	-	-	1.5	K/W
Thermal resistance, junction - ambient, leaded	$R_{thJA}$	-	-	100	
SMD version, device on PCB:	$R_{thJA}$				
@ min. footprint		-	-	75	
@ 6 cm <sup>2</sup> cooling area <sup>1)</sup>		-	-	50	

**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Values			Unit
		min.	typ.	max.	
Static Characteristics					
Drain-source breakdown voltage $V_{GS}=0V, I_D=1mA$	$V_{(BR)DSS}$	100	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 44 \mu A$	$V_{GS(th)}$	2.1	3	4	
Zero gate voltage drain current $V_{DS}=100V, V_{GS}=0V, T_j=25^{\circ}C$ $V_{DS}=100V, V_{GS}=0V, T_j=125^{\circ}C$	$I_{DSS}$	- -	0.01 1	1 100	$\mu A$
Gate-source leakage current $V_{GS}=20V, V_{DS}=0V$	$I_{GSS}$	-	1	100	
Drain-source on-state resistance $V_{GS}=10V, I_D=-A$	$R_{DS(on)}$	-	tbd	85	$m\Omega$

<sup>1</sup>Device on 40mm\*40mm\*1.5mm epoxy PCB FR4 with 6cm<sup>2</sup> (one layer, 70  $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

**Electrical Characteristics**, at  $T_j = 25^\circ\text{C}$ , unless otherwise specified

Parameter	Symbol	Conditions	Values			Unit
			min.	typ.	max.	

**Dynamic Characteristics**

Transconductance	$g_{fs}$	$V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = -A$	tbd	tbd	-	S
Input capacitance	$C_{iss}$	$V_{GS}=0V$ , $V_{DS}=25V$ , $f=1MHz$	-	tbd	tbd	pF
Output capacitance	$C_{oss}$		-	tbd	tbd	
Reverse transfer capacitance	$C_{rss}$		-	tbd	tbd	
Turn-on delay time	$t_{d(on)}$	$V_{DD}=50V$ , $V_{GS}=10V$ , $I_D=21A$ , $R_G=13\Omega$	-	tbd	tbd	ns
Rise time	$t_r$		-	tbd	tbd	
Turn-off delay time	$t_{d(off)}$		-	tbd	tbd	
Fall time	$t_f$		-	tbd	tbd	

**Gate Charge Characteristics**

Gate to source charge	$Q_{gs}$	$V_{DD}=17V$ , $I_D=21A$	-	tbd	tbd	nC
Gate to drain charge	$Q_{gd}$		-	tbd	tbd	
Gate charge total	$Q_g$	$V_{DD}=17V$ , $I_D=21A$ , $V_{GS}=0$ to $10V$	-	tbd	tbd	
Gate plateau voltage	$V_{(plateau)}$	$V_{DD}=17V$ , $I_D=21A$	-	tbd	-	V

**Reverse Diode**

Inverse diode continuous forward current	$I_S$	$T_C=25^\circ\text{C}$	-	-	21	A
Inverse diode direct current, pulsed	$I_{SM}$		-	-	84	
Inverse diode forward voltage	$V_{SD}$	$V_{GS}=0V$ , $I_F=21A$	-	tbd	tbd	V
Reverse recovery time	$t_{rr}$	$V_R=50V$ , $I_F=I_S$ , $di_F/dt=100A/\mu s$	-	tbd	tbd	ns
Reverse recovery charge	$Q_{rr}$		-	tbd	tbd	nC

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