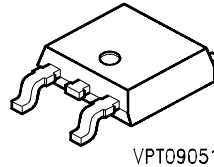
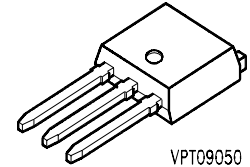


## Cool MOS™ Power Transistor

- N-Channel
- Enhancement mode
- Ultra low gate charge
- Avalanche rated
- dv/dt rated
- 150°C operating temperature



VPT09051



VPT09050

Pin 1	Pin 2	Pin 3
G	D	S

Type	V <sub>DS</sub>	I <sub>D</sub>	R <sub>DS(on)</sub>	Marking	Package	Ordering Code
SPUX5N60S5	600 V	1.8 A	3 Ω	X5N60S5	P-TO251-3-1	-
SPDX5N60S5					P-TO252	-

### Maximum Ratings , at T<sub>j</sub> = 25 ° C, unless otherwise specified

Parameter	Symbol	Value	Unit
Continuous drain current T <sub>C</sub> = 25 °C T <sub>C</sub> = 100 °C	I <sub>D</sub>	1.8 1.1	A
Pulsed drain current , t <sub>p</sub> = 1ms T <sub>C</sub> = 25 °C	I <sub>D puls</sub>	3.6	
Avalanche energy, single pulse I <sub>D</sub> = 1.8 A, V <sub>DD</sub> = 50 V, R <sub>GS</sub> = 25 Ω	E <sub>AS</sub>	50	mJ
Reverse diode dv/dt I <sub>S</sub> = 1.8 A, V <sub>DS</sub> < V <sub>DSS</sub> , di/dt = 100 A/μs, T <sub>jmax</sub> = 150 °C	dv/dt	6	kV/μs
Gate source voltage	V <sub>GS</sub>	±20	V
Power dissipation T <sub>C</sub> = 25 °C	P <sub>tot</sub>	25	W
Operating temperature	T <sub>j</sub>	-55 ... +150	°C
Storage temperature	T <sub>stg</sub>	-55 ... +150	
IEC climatic category; DIN IEC 68-1		55/150/56	

### Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

### Thermal Characteristics

Thermal resistance, junction - case	$R_{thJC}$	-	-	5	K/W
Thermal resistance, junction - ambient (Leaded and through-hole packages)	$R_{thJA}$	-	100	-	
SMD version, device on PCB: @ min. footprint @ 6 cm <sup>2</sup> cooling area <sup>1)</sup>	$R_{thJA}$	-	tbd	-	

### Static Characteristics

Drain- source breakdown voltage $V_{GS} = 0\text{ V}$ , $I_D = 0.25\text{ mA}$	$V_{(BR)DSS}$	600	-	-	V
Gate threshold voltage, $V_{GS} = V_{DS}$ $I_D = 80\text{ }\mu\text{A}$ , $T_j = 25\text{ °C}$	$V_{GS(th)}$	3.5	4.5	5.5	
Zero gate voltage drain current, $V_{DS} = V_{DSS}$ $V_{GS} = 0\text{ V}$ , $T_j = 25\text{ °C}$ $V_{GS} = 0\text{ V}$ , $T_j = 150\text{ °C}$	$I_{DSS}$	-	0.5	1 tbd	$\mu\text{A}$
Gate-source leakage current $V_{GS} = 20\text{ V}$ , $V_{DS} = 0\text{ V}$	$I_{GSS}$	-	-	100	nA
Drain-Source on-state resistance $V_{GS} = 10\text{ V}$ , $I_D = 1.1\text{ A}$	$R_{DS(on)}$	-	tbd	3	$\Omega$

<sup>1</sup> Device on 50mm\*50mm\*1.5mm epoxy PCB FR4 with 6 cm<sup>2</sup> (one layer, 70 $\mu\text{m}$  thick) copper area for drain connection. PCB is vertical without blown air.

## Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
<b>Characteristics</b>					
Transconductance $V_{DS} \geq 2 \cdot I_D \cdot R_{DS(on)max}$ , $I_D = 1.1\text{ A}$	$g_{fs}$	-	tbd	-	S
Input capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{iss}$	-	220	tbd	pF
Output capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{oss}$	-	140	tbd	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$ , $V_{DS} = 25\text{ V}$ , $f = 1\text{ MHz}$	$C_{rss}$	-	8	tbd	
Turn-on delay time $V_{DD} = 350\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 1.8\text{ A}$ , $R_G = 50\text{ }\Omega$	$t_{d(on)}$	-	tbd	tbd	ns
Rise time $V_{DD} = 350\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 1.8\text{ A}$ , $R_G = 50\text{ }\Omega$	$t_r$	-	tbd	-	
Turn-off delay time $V_{DD} = 350\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 1.8\text{ A}$ , $R_G = 50\text{ }\Omega$	$t_{d(off)}$	-	tbd	tbd	
Fall time $V_{DD} = 350\text{ V}$ , $V_{GS} = 10\text{ V}$ , $I_D = 1.8\text{ A}$ , $R_G = 50\text{ }\Omega$	$t_f$	-	tbd	-	

## Electrical Characteristics

Parameter at $T_j = 25\text{ °C}$ , unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	

## Gate Charge Characteristics

Gate-source charge $I_D = 1.8\text{ A}$ , $V_{DD} = 350\text{ V}$	$Q_{gs}$	-	tbd	-	nC
Gate-drain charge $I_D = 1.8\text{ A}$ , $V_{DD} = 350\text{ V}$	$Q_{gd}$	-	tbd	-	
Total gate charge $V_{DD} = 350\text{ V}$ , $I_D = 1.8\text{ A}$ , $V_{GS} = 0\text{ to }10\text{ V}$	$Q_g$	-	7	tbd	

## Reverse Diode

Inverse diode continuous forward current $T_C = 25\text{ °C}$	$I_S$	-	-	1.8	A
Inverse diode direct current, pulsed $T_C = 25\text{ °C}$	$I_{SM}$	-	-	3.6	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$ , $I_F = 1.8\text{ A}$	$V_{SD}$	-	tbd	1.2	V
Reverse recovery time $V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$t_{rr}$	-	tbd	-	ns
Reverse recovery charge $V_R = 100\text{ V}$ , $I_F = I_S$ , $di_F/dt = 100\text{ A}/\mu\text{s}$	$Q_{rr}$	-	tbd	-	$\mu\text{C}$

**Edition 7.97**

**Published by Siemens AG,  
Bereich Halbleiter Vertrieb,  
Werbung, Balanstraße 73,  
81541 München**

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**Errata Sheet 26.10.98  
New RDSON-LIMIT**