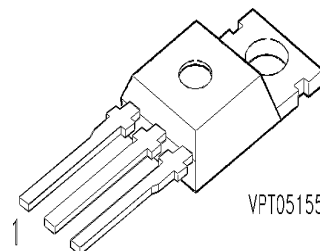
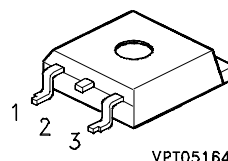


Cool MOS™ Power Transistor

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



1	2	3
G	D	S

Type	V_{DS}	I_D	$R_{DS(on)}$	Marking	Package	Ordering Code
SPPX4N60S5	600 V	3.2 A	1.4 Ω	X4N60S5	P-TO220-3-1	-
SPBX4N60S5					P-TO263-3-2	-

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

Parameter	Symbol	Value	Unit
Drain source voltage	V_{DSS}	600	V
Continuous drain current $T_C = 25^\circ\text{C}$ $T_C = 100^\circ\text{C}$	I_D	3.2 2	A
Pulsed drain current $T_C = 25^\circ\text{C}$	$I_{D \text{ puls}}$	6.4	
Avalanche energy, single pulse $I_D = 3.2 \text{ A}$, $V_{DD} = 50 \text{ V}$, $R_{GS} = 25 \Omega$	E_{AS}	100	mJ
Avalanche current (periodic, limited by T_{jmax})	I_{AR}	tbd	A
Avalanche energy (10 kHz, limited by T_{jmax})	E_{AR}	tbd	mJ
Reverse diode dv/dt $I_S = 3.2 \text{ A}$, $V_{DS} < V_{DSS}$, $di/dt = 100 \text{ A}/\mu\text{s}$, $T_{jmax} = 150^\circ\text{C}$	dv/dt	6	KV/ μs
Gate source voltage	V_{GS}	± 20	V
Power dissipation $T_C = 25^\circ\text{C}$	P_{tot}	38	W
Operating temperature	T_j	-55 ... +150	$^\circ\text{C}$
Storage temperature	T_{stg}	-55 ... +150	
IEC climatic category; DIN IEC 68-1		40/150/56	

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}	-	-	3.3	K/W
Thermal resistance, junction - ambient (Leaded and through-hole packages)	R_{thJA}	-	62	-	
SMD version, device on PCB: @ min. footprint @ 6 cm ² cooling area ¹⁾	R_{thJA}	- -	tbd 39	- -	

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, $V_{GS} = V_{DS}$ $I_D = 135\text{ }\mu\text{A}$, $T_j = 25\text{ °C}$ $I_D = 135\text{ }\mu\text{A}$, $T_j = 150\text{ °C}$	$V_{GS(th)}$	3.5 tbd	4.5 -	5.5 -	
Zero gate voltage drain current, $V_{DS} = V_{DSS}$ $V_{GS} = 0\text{ V}$, $T_j = -40\text{ °C}$ $V_{GS} = 0\text{ V}$, $T_j = 25\text{ °C}$ $V_{GS} = 0\text{ V}$, $T_j = 150\text{ °C}$	I_{DSS}	- - -	- 0.5 -	0.1 1 tbd	μA
Gate-source leakage current $V_{GS} = 20\text{ V}$, $V_{DS} = 0\text{ V}$	I_{GSS}	-	10	100	nA
Drain-Source on-state resistance $V_{GS} = 10\text{ V}$, $I_D = 2\text{ A}$	$R_{DS(on)}$	-	tbd	1.4	Ω

¹⁾ Device on 50mm*50mm*1.5mm epoxy PCB FR4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical without blown air.

Electrical Characteristics

Parameter at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Characteristics					
Transconductance $V_{DS} \geq 2 * I_D * R_{DS(ON)max}$, $I_D = 2\text{ A}$	g_{fs}	-	tbd	-	S
Input capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{iss}	-	400	tbd	pF
Output capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{oss}	-	260	tbd	
Reverse transfer capacitance $V_{GS} = 0\text{ V}$, $V_{DS} = 25\text{ V}$, $f = 1\text{ MHz}$	C_{rss}	-	14	tbd	
Turn-on delay time	$t_{d(ON)}$	-	30	tbd	ns
Rise time $V_{DD} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 3.2\text{ A}$, $R_G = 20\text{ }\Omega$	t_r	-	23	-	
Turn-off delay time $V_{DD} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 3.2\text{ A}$, $R_G = 20\text{ }\Omega$	$t_{d(OFF)}$	-	46	tbd	
Fall time $V_{DD} = 350\text{ V}$, $V_{GS} = 10\text{ V}$, $I_D = 3.2\text{ A}$, $R_G = 20\text{ }\Omega$	t_f	-	11	-	

Electrical Characteristics

Parameter at $T_j = 25\text{ }^{\circ}\text{C}$, unless otherwise specified	Symbol	Values			Unit
		min.	typ.	max.	
Gate Charge Characteristics					
Gate-source charge $I_D = 3.2\text{ A}$, $V_{DD} = 400\text{ V}$	Q_{gs}	-	tbd	-	nC
Gate-drain Charge $I_D = 3.2\text{ A}$, $V_{DD} = 400\text{ V}$	Q_{gd}	-	tbd	-	
Total gate charge $V_{DD} = 400\text{ V}$, $I_D = 3.2\text{ A}$, $V_{GS} = 0\text{ to }10\text{ V}$	Q_G	-	13	tbd	

Reverse Diode

Continuous source current $T_C = 25\text{ °C}$	I_S	-	-	3.2	A
Pulsed source current $T_C = 25\text{ °C}$	I_{SM}	-	-	6.4	
Inverse diode forward voltage $V_{GS} = 0\text{ V}$, $I_F = 3.2\text{ A}$	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 $V_R = 100$, $I_F = I_S$, $di_F/dt = 100\text{ A}/\mu\text{s}$	Q_{rr}	-	tbd	-	μC

Edition 7.97

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

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Erata sheet to target data sheet SPPX4N60S5:**Samples with datecode ≤ 830 :**

- Reduced avalanche rating
- Reverse diode $v/dt \leq 4 \text{ KV}/\mu\text{s}$
- Gate threshold voltage $V_{GS(th)}$: upper limit 6V