

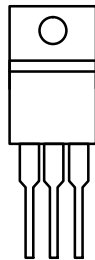


**THE DATASHEET OF  
SUP50N10-21P-GE3**



## N-Channel 100 V (D-S) MOSFET

PRODUCT SUMMARY			
$V_{DS}$ (V)	$R_{DS(on)}$ ( $\Omega$ ) Max.	$I_D$ (A)	$Q_g$ (Typ.)
100	0.021 at $V_{GS} = 10$ V	50 <sup>d</sup>	30.2 nC
	0.023 at $V_{GS} = 8$ V	49.7	
	0.028 at $V_{GS} = 6$ V	45	

**TO-220AB**


G D S

Top View

**Ordering Information:**

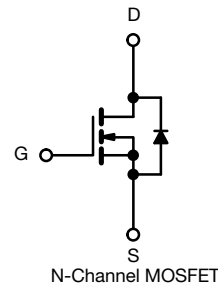
SUP50N10-21P-GE3 (Lead (Pb)-free and Halogen-free)

**FEATURES**

- TrenchFET® Power MOSFET
- 100 %  $R_g$  and UIS Tested
- Material categorization:  
For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT  
HALOGEN  
**FREE**
**APPLICATIONS**

- DC/AC Inverters
- Primary Side Switching
- Synchronous Rectification



ABSOLUTE MAXIMUM RATINGS ( $T_C = 25$ °C, unless otherwise noted)			
Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	100	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	
Continuous Drain Current ( $T_J = 150$ °C)	$I_D$	$T_C = 25$ °C	50 <sup>d</sup>
		$T_C = 70$ °C	41.6
Pulsed Drain Current ( $t = 300$ $\mu$ s)	$I_{DM}$	60	A
Avalanche Current	$I_{AS}$	40	
Single Avalanche Energy <sup>a</sup>	$E_{AS}$	80	mJ
Maximum Power Dissipation <sup>a</sup>	$P_D$	$T_C = 25$ °C	125 <sup>b</sup>
		$T_A = 25$ °C <sup>c</sup>	3.1
Operating Junction and Storage Temperature Range	$T_J, T_{stg}$	- 55 to 150	°C

THERMAL RESISTANCE RATINGS			
Parameter	Symbol	Limit	Unit
Junction-to-Ambient (PCB Mount) <sup>c</sup>	$R_{thJA}$	40	°C/W
Junction-to-Case (Drain)	$R_{thJC}$	1	

Notes:

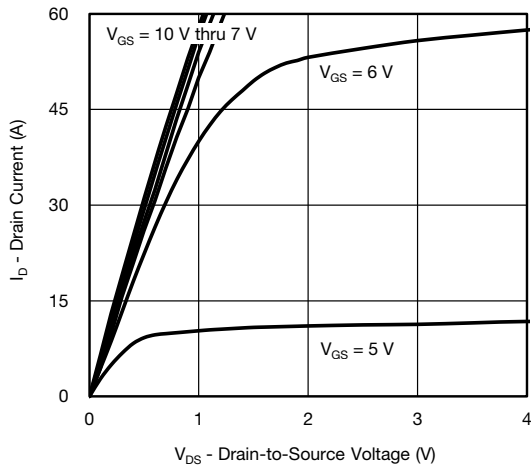
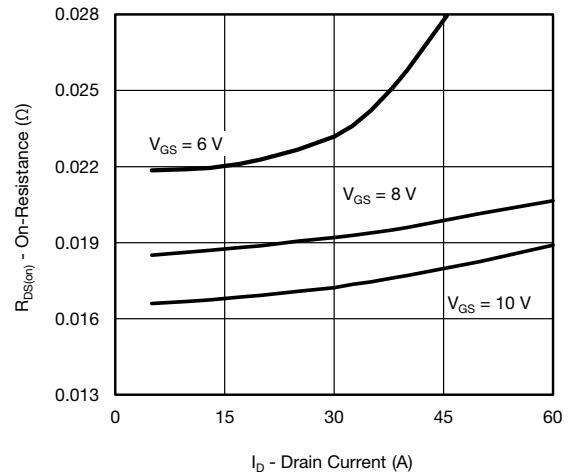
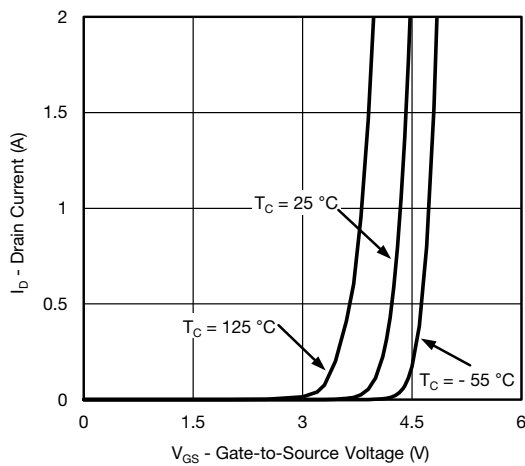
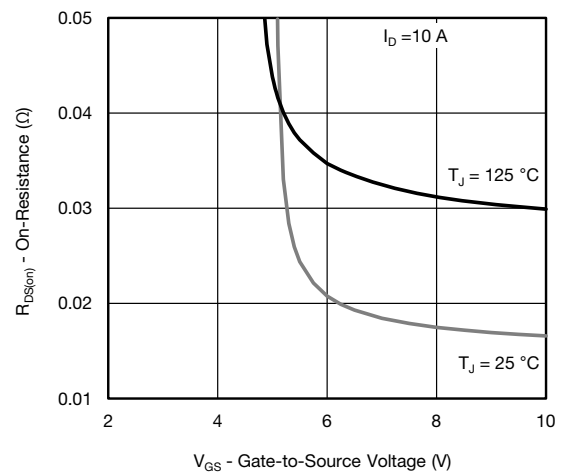
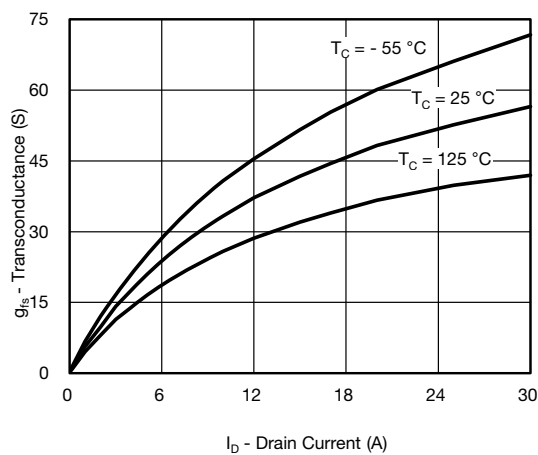
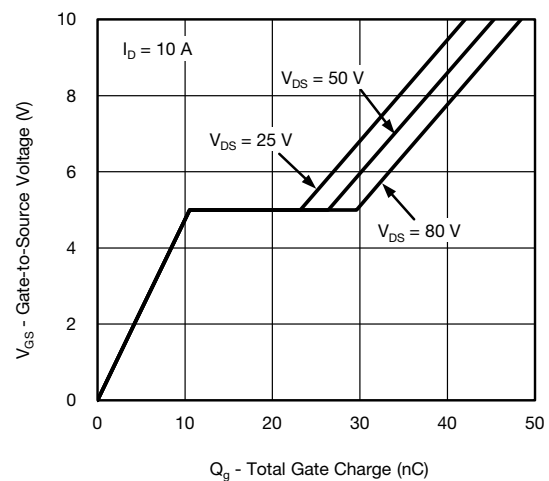
- Duty cycle  $\leq 1$  %.
- See SOA curve for voltage derating.
- When mounted on 1" square PCB (FR-4 material).
- Package limited.

<b>SPECIFICATIONS</b> ( $T_J = 25\text{ }^\circ\text{C}$ , unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{DS}$	$V_{GS} = 0\text{ V}, I_D = 250\text{ }\mu\text{A}$	100			V
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\text{ }\mu\text{A}$	2		4	
Gate-Body Leakage	$I_{GSS}$	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			$\pm 250$	nA
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}$			1	$\mu\text{A}$
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 125\text{ }^\circ\text{C}$			50	
		$V_{DS} = 100\text{ V}, V_{GS} = 0\text{ V}, T_J = 150\text{ }^\circ\text{C}$			250	
On-State Drain Current <sup>a</sup>	$I_{D(on)}$	$V_{DS} \geq 10\text{ V}, V_{GS} = 10\text{ V}$	20			A
Drain-Source On-State Resistance <sup>a</sup>	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		0.017	0.021	$\Omega$
		$V_{GS} = 8\text{ V}, I_D = 9.6\text{ A}$		0.019	0.023	
		$V_{GS} = 6\text{ V}, I_D = 8.7\text{ A}$		0.022	0.028	
Forward Transconductance <sup>a</sup>	$g_{fs}$	$V_{DS} = 20\text{ V}, I_D = 10\text{ A}$		40		S
<b>Dynamic<sup>b</sup></b>						
Input Capacitance	$C_{iss}$	$V_{GS} = 0\text{ V}, V_{DS} = 50\text{ V}, f = 1\text{ MHz}$		2055		$\mu\text{F}$
Output Capacitance	$C_{oss}$			227		
Reverse Transfer Capacitance	$C_{rss}$			120		
Total Gate Charge <sup>c</sup>	$Q_g$	$V_{DS} = 50\text{ V}, V_{GS} = 10\text{ V}, I_D = 10\text{ A}$		45	68	nC
Gate-Source Charge <sup>c</sup>	$Q_{gs}$			10.5		
Gate-Drain Charge <sup>c</sup>	$Q_{gd}$			15.9		
Gate Resistance	$R_g$	$f = 1\text{ MHz}$	0.3	1.5	3	$\Omega$
Turn-On Delay Time <sup>c</sup>	$t_{d(on)}$	$V_{DD} = 20\text{ V}, R_L = 2\text{ }\Omega$ $I_D \cong 8\text{ A}, V_{GEN} = 10\text{ V}, R_g = 1\text{ }\Omega$		10	20	ns
Rise Time <sup>c</sup>	$t_r$			10	20	
Turn-Off Delay Time <sup>c</sup>	$t_{d(off)}$			22	33	
Fall Time <sup>c</sup>	$t_f$			7	14	
<b>Drain-Source Body Diode Ratings and Characteristics</b> ( $T_C = 25\text{ }^\circ\text{C}$ ) <sup>b</sup>						
Continuous Current	$I_S$				50	A
Pulsed Current	$I_{SM}$				60	
Forward Voltage <sup>a</sup>	$V_{SD}$	$I_F = 8\text{ A}, V_{GS} = 0\text{ V}$		0.75	1.2	V
Reverse Recovery Time	$t_{rr}$	$I_F = 8\text{ A}, di/dt = 100\text{ A}/\mu\text{s}$		55	83	ns
Peak Reverse Recovery Current	$I_{RM(REC)}$			4.1	6.2	A
Reverse Recovery Charge	$Q_{rr}$			107	161	nC

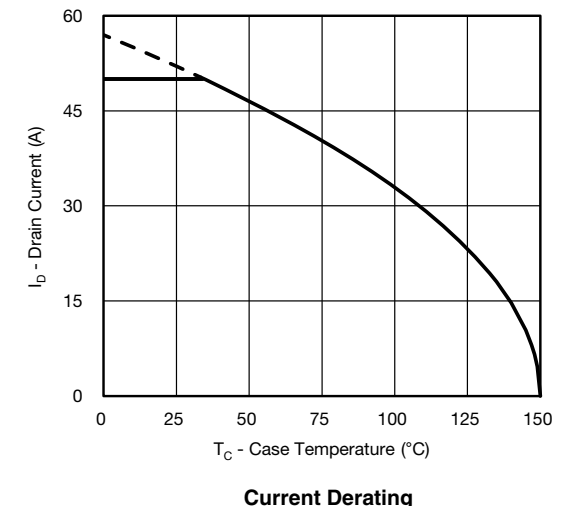
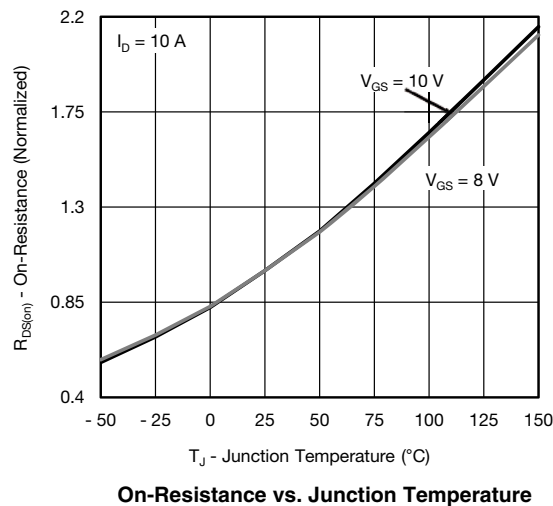
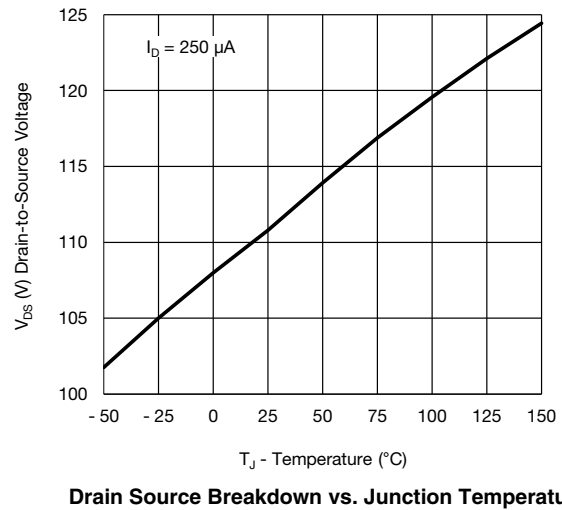
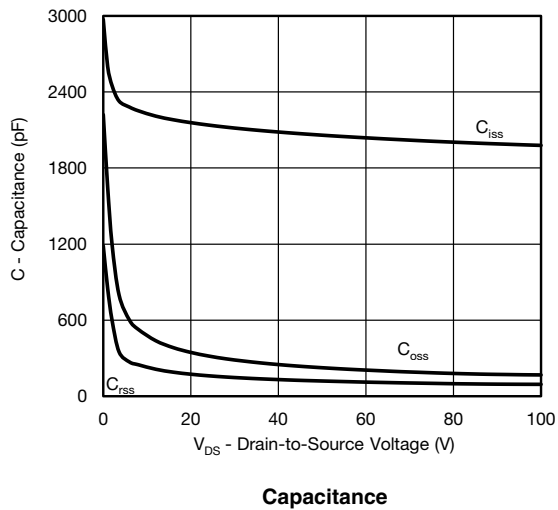
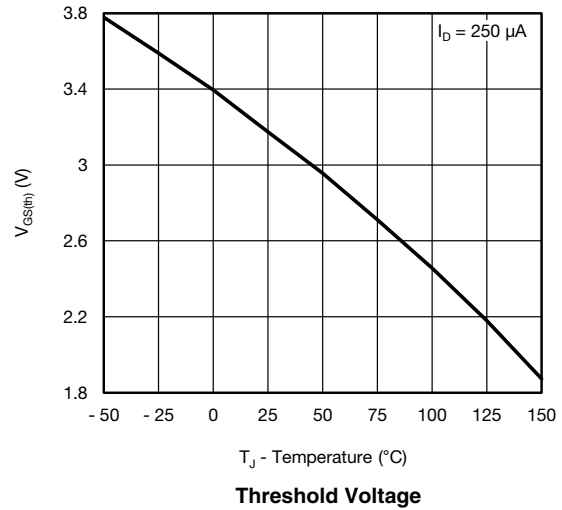
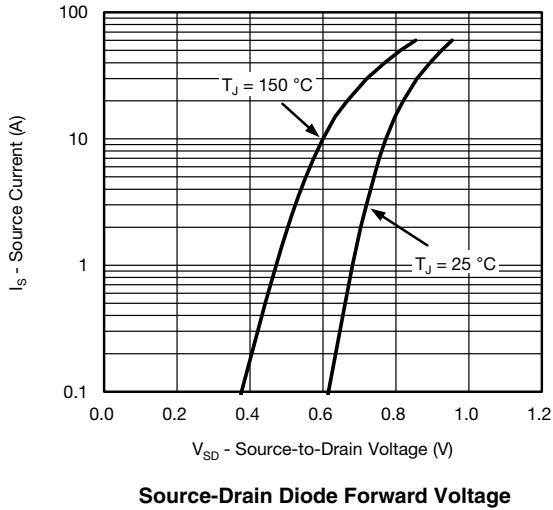
Notes:

- Pulse test; pulse width  $\leq 300\text{ }\mu\text{s}$ , duty cycle  $\leq 2\%$ .
- Guaranteed by design, not subject to production testing.
- Independent of operating temperature.

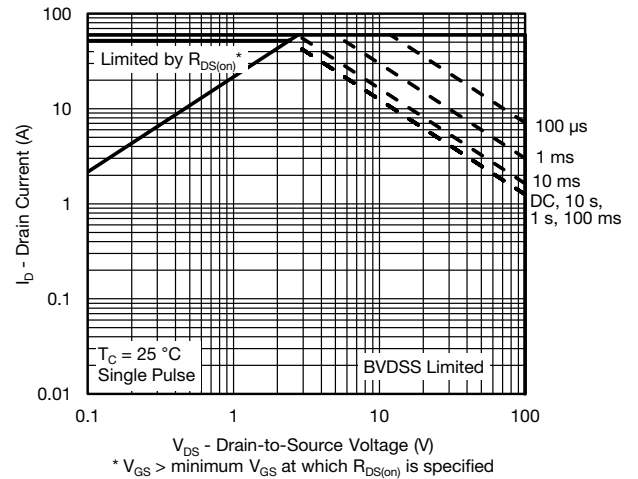
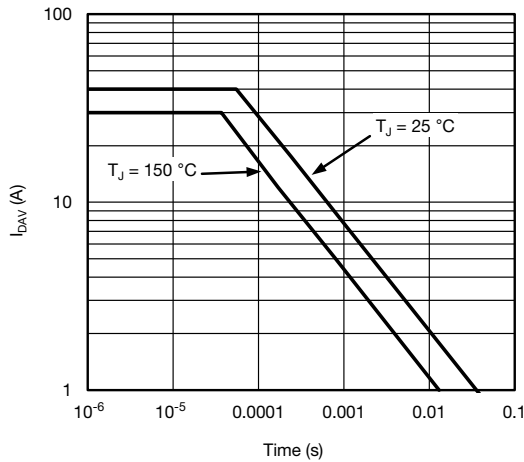
Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

**TYPICAL CHARACTERISTICS** (25 °C, unless otherwise noted)

**Output Characteristics**

**On-Resistance vs. Drain Current**

**Transfer Characteristics**

**On-Resistance vs. Gate-to-Source Voltage**

**Transconductance**

**Gate Charge**

## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

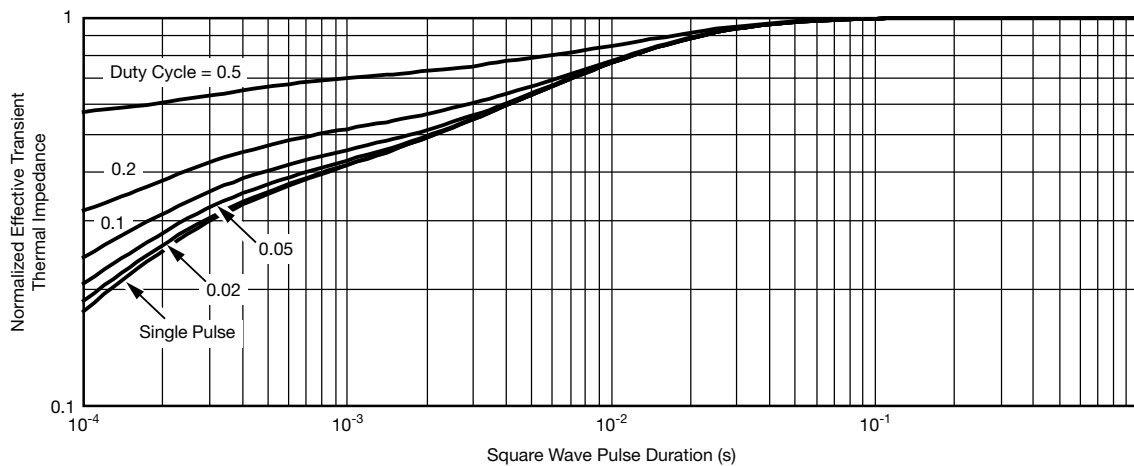


## TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



Single Pulse Avalanche Current Capability vs. Time

Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case

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### TO-220AB

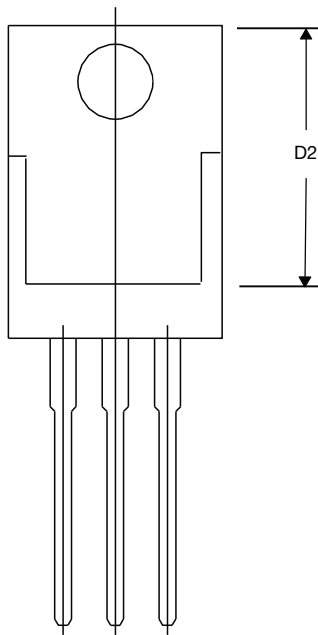


DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	4.25	4.65	0.167	0.183
b	0.69	1.01	0.027	0.040
b(1)	1.20	1.73	0.047	0.068
c	0.36	0.61	0.014	0.024
D	14.85	15.49	0.585	0.610
D2	12.19	12.70	0.480	0.500
E	10.04	10.51	0.395	0.414
e	2.41	2.67	0.095	0.105
e(1)	4.88	5.28	0.192	0.208
F	1.14	1.40	0.045	0.055
H(1)	6.09	6.48	0.240	0.255
J(1)	2.41	2.92	0.095	0.115
L	13.35	14.02	0.526	0.552
L(1)	3.32	3.82	0.131	0.150
$\varnothing P$	3.54	3.94	0.139	0.155
Q	2.60	3.00	0.102	0.118

ECN: T14-0413-Rev. P, 16-Jun-14  
DWG: 5471

**Note**

\* M = 1.32 mm to 1.62 mm (dimension including protrusion)  
Heatsink hole for HVM





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