Siliconix incorporated

VNT008D/9D, VNS008D/9D

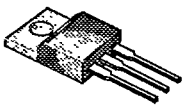
N-Channel Enhancement Mode Transistors

T-39-13

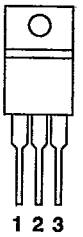
PRODUCT SUMMARY

PART NUMBER	$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
VNT008D	650	1.5	5.77
VNS008D	600	1.5	5.77
VNT009D	650	2.0	5.0
VNS009D	600	2.0	5.0

TO-220AB



TOP VIEW



1 2 3

1 GATE
2 DRAIN (Connected to TAB)
3 SOURCE

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C Unless Otherwise Noted)

PARAMETERS/TEST CONDITIONS		SYMBOL	VNT 008D	VNS 008D	VNT 009D	VNS 009D	UNITS
Drain-Source Voltage		V_{DS}	650	600	650	600	V
Gate-Source Voltage		V_{GS}	±20	±20	±20	±20	
Continuous Drain Current	T_C = 25°C	I_D	5.77	5.77	5.0	5.0	A
	T_C = 100°C		3.65	3.65	3.16	3.16	
Pulsed Drain Current[1]		I_{DM}	15	15	14	14	
Avalanche Current (See Figure 9)		I_A	5.77	5.77	5.0	5.0	
Power Dissipation	T_C = 25°C	P_D	125	125	125	125	W
	T_C = 100°C		50	50	50	50	
Operating Junction & Storage Temperature Range		T_J, T_{stg}	−55 to 150				°C
Lead Temperature ($^1/_{16}$" from case for 10 sec.)		T_L	300				

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THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R_{thJC}		1.0	K/W
Junction-to-Ambient	R_{thJA}		80	
Case-to-Sink	R_{thCS}	1.0		

[1]Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

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ELECTRICAL CHARACTERISTICS (T_J = 25°C Unless Otherwise Noted)

PARAMETER		SYMBOL	TEST CONDITIONS	TYP	LIMITS MIN	LIMITS MAX	UNIT
STATIC							
Drain-Source Breakdown Voltage	VNT008D, VNT009D VNS008D, VNS009D	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 2000 µA		650 600		V
Gate Threshold Voltage		$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 1000 µA		2.0	4.0	
Gate-Body Leakage		I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V			±100	nA
Zero Gate Voltage Drain Current		I_{DSS}	V_{DS} = $V_{(BR)DSS}$, V_{GS} = 0 V			2000	µA
			V_{DS} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 0 V, T_J = 125°C			2000	
On-State Drain Current[1]		$I_{D(ON)}$	V_{DS} = 10 V, V_{GS} = 10 V		5.7		A
Drain-Source On-State Resistance[1]	VNT008D, VNS008D VNT009D, VNS009D	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 3 A	1.2 1.7		1.5 2.0	Ω
	VNT008D, VNS008D VNT009D, VNS009D		V_{GS} = 10 V, I_D = 3 A, T_J = 125°C	2.4 3.4		3.75 6.0	
Forward Transconductance[1]		g_{fs}	V_{DS} = 15 V, I_D = 3 A	3.3	3.0		S
DYNAMIC							
Input Capacitance		C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	1200		1500	pF
Output Capacitance		C_{oss}		140		150	
Reverse Transfer Capacitance		C_{rss}		40		50	
Total Gate Charge[2]		Q_g	V_{DS} = 0.5 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 5.7 A	53		65	nC
Gate-Source Charge[2]		Q_{gs}		12.9			
Gate-Drain Charge[2]		Q_{gd}		26			
Turn-On Delay Time[2]		$t_{d(on)}$	V_{DD} = 325 V, R_L = 130 Ω I_D ≃ 2.5 A, V_{GEN} = 10 V, R_G = 4.7 Ω	15		20	ns
Rise Time[2]		t_r		20		25	
Turn-Off Delay Time[2]		$t_{d(off)}$		80		85	
Fall Time[2]		t_f		45		50	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25°C)							
Continuous Current	VNT008D, VNS008D VNT009D, VNS009D	I_S				5.77 5.0	A
Pulsed Current[3]	VNT008D, VNS008D VNT009D, VNS009D	I_{SM}				15 14	
Forward Voltage[1]	VNT008D, VNS008D VNT009D, VNS009D	V_{SD}	I_F = I_S, V_{GS} = 0 V			2.5 2.0	V
Reverse Recovery Time		t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	400			ns
Reverse Recovery Charge		Q_{rr}		2.5			µC

[1]Pulse test: Pulse Width ≤ 300 µsec, Duty Cycle ≤ 2%.
[2]Independent of operating temperature.
[3]Pulse width limited by maximum junction temperature (refer to transient thermal impedance data, Figure 11).

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TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

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Figure 1. Output Characteristics

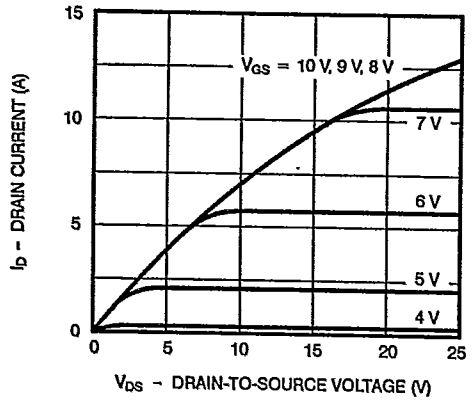


Figure 2. Transfer Characteristics

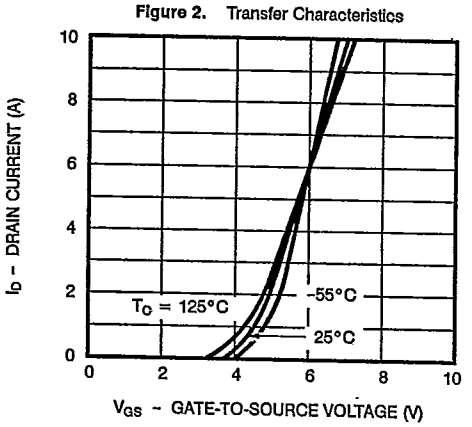


Figure 3. Transconductance

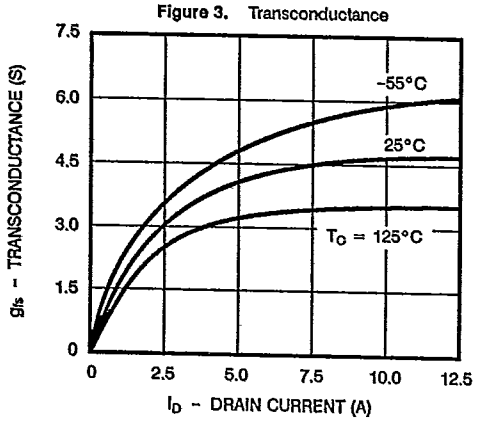


Figure 4. On-Resistance

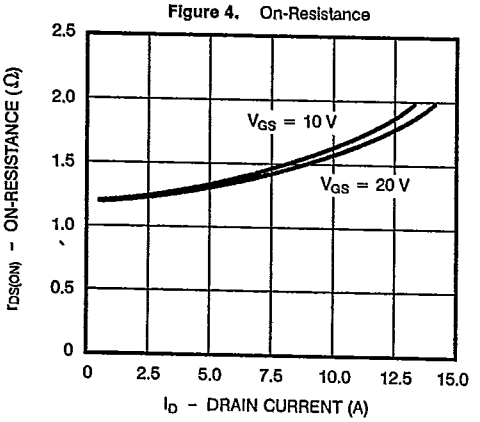


Figure 5. Capacitance

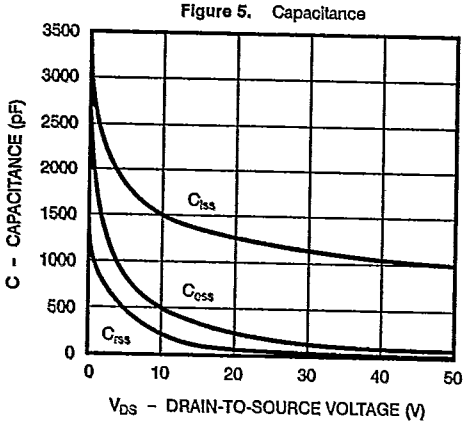
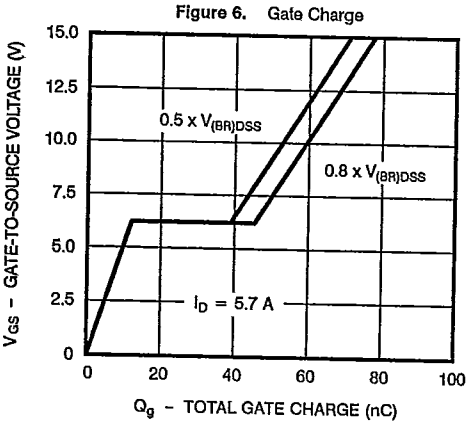


Figure 6. Gate Charge



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TYPICAL CHARACTERISTICS (Cont'd)

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Figure 7. On-Resistance vs. Junction Temperature

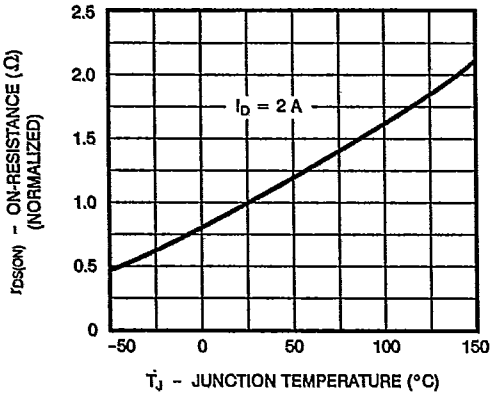
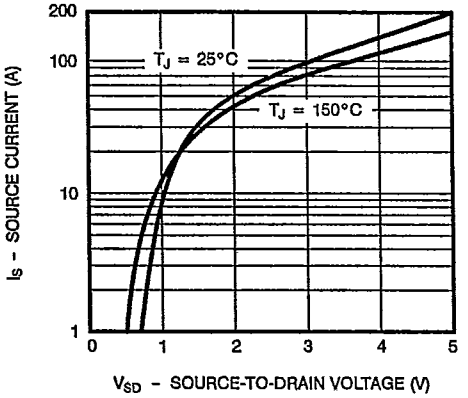


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

Figure 9. Maximum Avalanche and Drain Current vs. Case Temperature

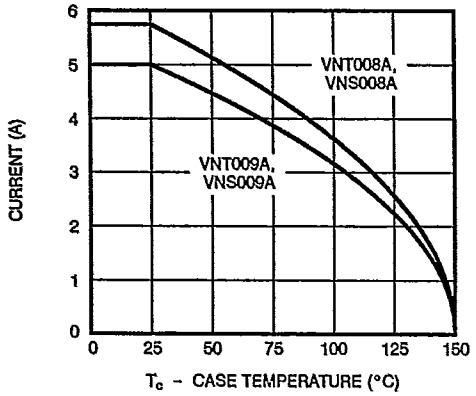
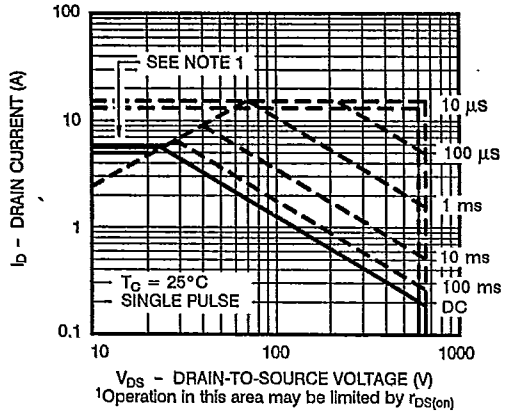


Figure 10. Safe Operating Area



[1]Operation in this area may be limited by $r_{DS(on)}$

Figure 11. Normalized Effective Transient Thermal Impedance, Junction-to-Case