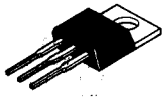
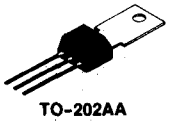
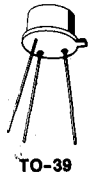
MOSPOWER Selector Guide (Continued)

N-Channel MOSPOWER (Continued)

Device	Breakdown Voltage (Volts)	$r_{DS(on)}$ (Ohms)	I_D Continuous (Amps)	Power Dissipation (Watts)	Part Number
	200	0.18	18.0	125	IRF640
	200	0.22	16.0	125	IRF642
	200	0.4	9.0	75	IRF630
	200	0.6	8.0	75	IRF632
	200	0.8	5.0	40	IRF620
	200	1.2	4.0	40	IRF622
	170	6.0	1.4	20	VN1706D
	150	0.18	18.0	125	IRF641
	150	0.22	16.0	125	IRF643
	150	0.4	9.0	75	IRF631
	150	0.6	8.0	75	IRF633
	150	0.8	5.0	40	IRF621
	150	1.2	4.0	40	IRF623
	120	0.18	14.0	75	VN1200D
	120	0.25	12.0	75	VN1201D
	120	6.0	1.4	20	VN1206D
	100	0.085	27.0	125	IRF540
	100	0.11	24.0	125	IRF542
	100	0.18	14.0	75	VN1000D
	100	0.18	14.0	75	IRF530
	100	0.25	12.0	75	VN1001D
	100	0.25	12.0	75	IRF532
	100	0.30	8.0	40	IRF520
 TO-220AB	100	0.40	7.0	40	IRF522
	80	0.18	14.0	75	VN0800D
	80	0.25	12.0	75	VN0801D
	80	4.0	1.7	20	VN88AD
	80	4.5	1.6	20	VN89AD
	60	0.085	27.0	125	IRF541
	60	0.11	24.0	125	IRF543
	60	0.12	18.0	75	VN0600D
	60	0.15	16.0	75	VN0601D
	60	0.18	14.0	75	IRF531
	60	0.25	12.0	75	IRF533
	60	0.30	8.0	40	IRF521
	60	0.40	7.0	40	IRF523
	60	3.0	1.9	20	VN66AD
	60	3.5	1.8	20	VN67AD
	40	0.12	18.0	75	VN0400D
	40	0.15	16.0	75	VN0401D
	40	3.0	1.9	20	VN46AD
	40	5.0	1.5	20	VN40AD
	30	1.2	2.5	20	VN0300D
	80	4.0	1.5	15	VN88AF
	80	4.5	1.4	15	VN89AF
	80	5.0	1.3	15	VN80AF
	60	3.0	1.7	15	VN66AF
	60	3.5	1.6	15	VN67AF
TO-202AA	40	3.0	1.6	15	VN46AF
	40	5.0	1.3	15	VN40AF
	240	6.0	0.8	6.25	VN2406B
	170	6.0	0.8	6.25	VN1706B
	120	6.0	0.8	6.25	VN1206B
	100	0.3	6.0	20	IRFF120
	100	0.4	5.0	20	IRFF122
	90	4.0	0.9	6.25	2N6661
	90	4.5	0.9	6.25	VN99AB
	90	5.0	0.8	6.25	VN90AB
	60	0.3	6.0	20	IRFF121
	60	0.4	5.0	20	IRFF123
 TO-39	60	3.0	1.1	6.25	2N6660
	60	3.5	1.0	6.25	VN67AB
	35	1.8	1.4	6.25	2N6659
	35	2.5	1.2	6.25	VN35AB

VN40AF ■ VN46AF

Siliconix

40V N-Channel Enhancement Mode MOSPOWER

These power FETs are designed especially for low power high frequency inverters, interface to CMOS and TTL logic, and line drivers.

FEATURES

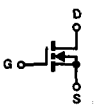
- **High Input Impedance**
- **Extremely Fast Switching**
- **Rugged—Dissipation Limited SOA**
- **Internal Drain-Source Diode**

BENEFITS

- **Reduced Component Count**
- **Simpler Designs**
  — Directly Interfaces CMOS & TTL
- **Improved Circuit Performance**
- **Increased Reliability**

Product Summary

Part Number	BV_{DSS} (Volts)	$R_{DS(ON)}$ (Ohms)	Package
VN40AF	40	5	TO-202
VN46AF	40	3	TO-202



ABSOLUTE MAXIMUM RATINGS (T_A = 25°C unless otherwise noted)

Drain-Source Voltage 40V

Drain-Gate Voltage 40V

Gate Current (Peak) . . . . . ±1A

Gate-Source Voltage . . . . . ± 40V

Drain Current
Continuous[1]
VN40AF . . . . . ±1.3A
VN46AF . . . . . ±1.6A
Pulsed[2] . . . . . ±3A

Maximum Dissipation
at 25°C Case 15W

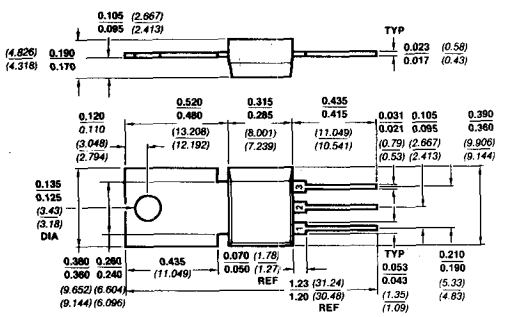
Linear Derating Factor . . . . . 120 mW/°C

Operating and Storage
Temperature . . . . . −55°C to +150°C

Lead Temperature
(1/16" from Case for 10 secs) . . +300°C

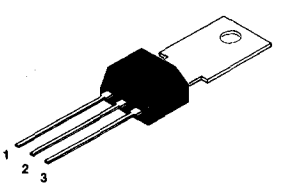
Notes:
1. Limited by package dissipation.
2. Pulse test—80μs to 300μs, 1% duty cycle.

PACKAGE DIMENSIONS



TO-202AA

PIN 1 — Source
PIN 2 — Gate
PIN 3 & TAB — Drain



ELECTRICAL CHARACTERISTICS (T_C=25°C unless otherwise noted)

Parameter		Part Number	Min	Max	Unit	Test Conditions
Static						
BV_{DSS}	Drain-Source Breakdown Voltage	All	40		V	I_D=10 μA, V_{GS}=0
$V_{GS(th)}$	Gate Threshold Voltage	All	0.8		V	I_D=1 mA, V_{DS}=V_{GS}
I_{GSS}	Gate-Body Leakage Current	All		100	nA	V_{GS}=15V, V_{DS}=0
I_{DSS}	Zero Gate Voltage Drain Current	All		10	μA	V_{DS}=0.8 Max Rating, V_{GS}=0
		All		500		V_{DS}=Max Rating, V_{GS}=0, T_A=125°C
$I_{D(on)}$	ON-State Drain Current[1]	All	1.0		A	V_{DS}=25V, V_{GS}=10V
$V_{DS(on)}$	Drain-Source ON-State Voltage	All		1.5	V	V_{GS}=5V, I_D=0.3A
		VN40AF		5.0		V_{GS}=10V, I_D=1A
		VN46AF		3.0		
$r_{DS(on)}$	Drain-Source, ON-State Resistance[1]	All		5.0	Ω	V_{GS}=5V, I_D=0.3A
		VN40AF		5.0		V_{GS}=10V, I_D=1A
		VN46AF		3.0		
Dynamic						
g_{fs}	Forward Transconductance[1]	All	170		mS	V_{DS}=25V, I_D=0.5A
C_{iss}	Input Capacitance	All		50	pF	V_{DS}=25V, V_{GS}=0, f=1 MHz
C_{rss}	Reverse Transfer Capacitance	All		10		
C_{oss}	Common Source Output Capacitance	All		65		
t_{ON}	Turn-ON Time	All		10	ns	V_{DD}=25V, I_D≈1A, R_L=23Ω, R_g=25Ω
t_{OFF}	Turn-OFF Time	All		10		
Drain-Source Diode Characteristics						
			Typ			
V_{SD}	Forward ON Voltage[1]	All	−0.9		V	I_S=−1A, V_{GS}=0
t_{rr}	Reverse Recovery Time	All	35		ns	V_{GS}=0, I_F=I_R=1A

Note:
1. Pulse test: 80-300 μs, 1% duty cycle.

Refer to VNMA Design Curves (See Section 4)

TEST CIRCUITS

FIGURE 1. Switching Test Circuit

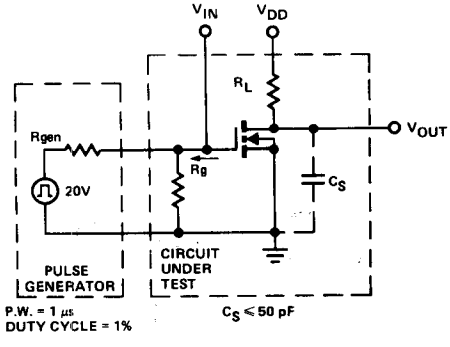
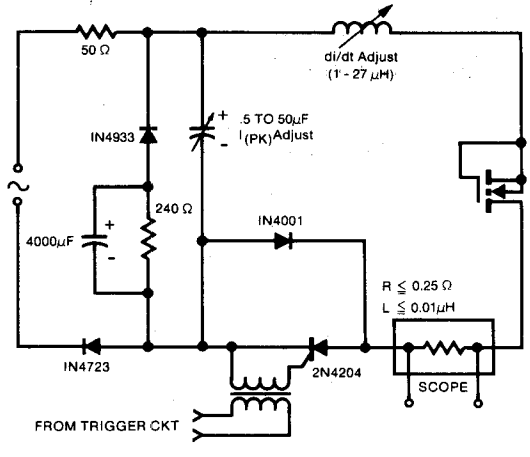


FIGURE 2. JEDEC Reverse Recovery Circuit

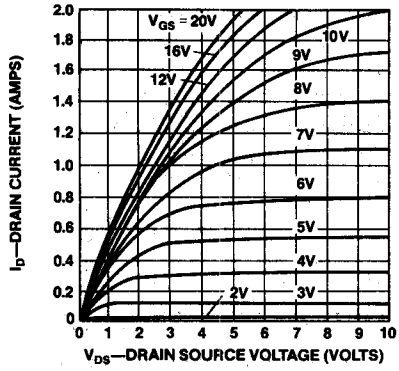


TYPICAL STATIC CHARACTERISTICS

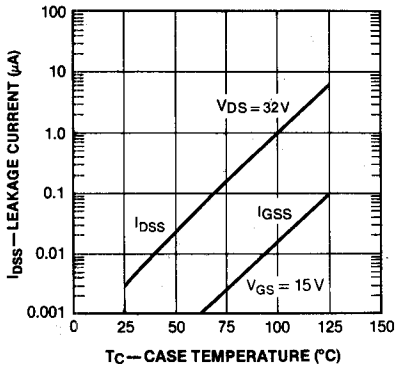
(Pulse width 80μs—300μs, Duty cycle 1%, T_C=25°C)

Part Numbers: VN99AA, VN99AB, VN90AA, VN90AB, VN89AD, VN89AF, VN88AD, VN88AF, VN80AF, VN0808M, VN67AA, VN67AD, VN67AB, VN67AF, VN66AD, VN66AF, VN0606M, VN46AD, VN46AF, VN40AD, VN40AF, VN35AA, VN35AB, 2N6656, 2N6657, 2N6658, 2N6659, 2N6660, 2N6661

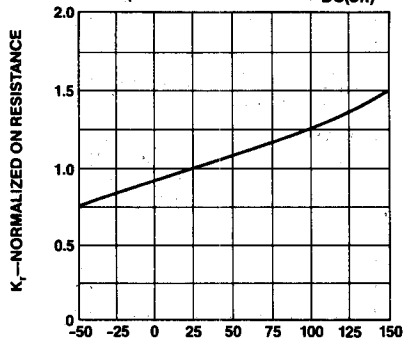
Ohmic Region



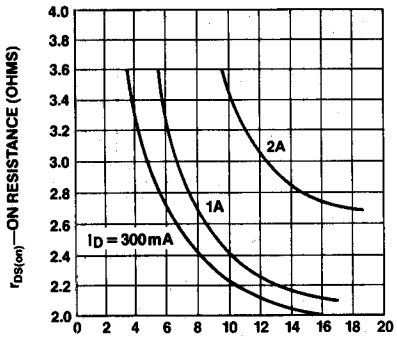
Leakage Current



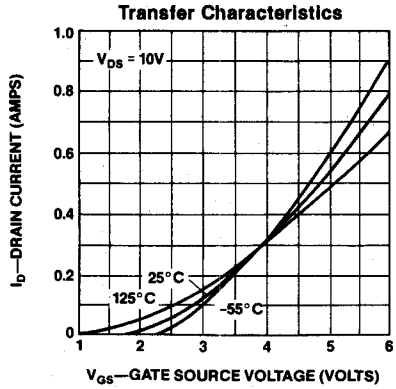
Temperature Effects on $r_{DS(on)}$



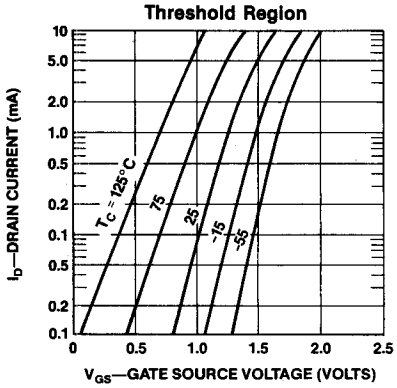
ON Resistance Characteristics



Transfer Characteristics



Threshold Region



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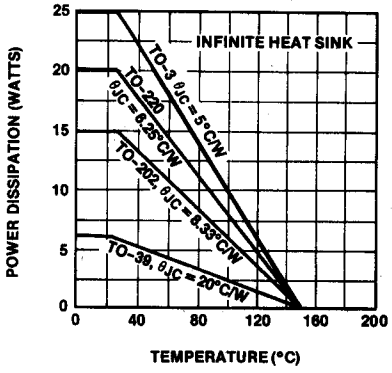
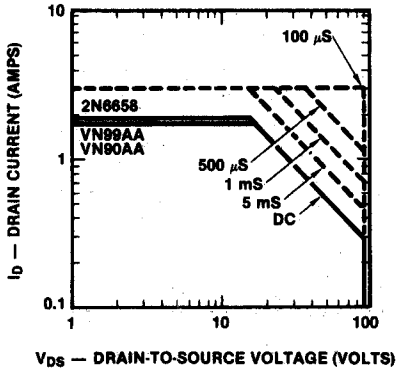
TYPICAL CHARACTERISTICS (Cont'd)

Part Numbers: VN99AA, VN99AB, VN90AA, VN90AB, VN89AD, VN89AF, VN88AD, VN88AF, VN80AF, VN0808M, VN67AA, VN67AD, VN67AB, VN67AF, VN66AD, VN66AF, VN0606M, VN46AD, VN46AF, VN40AD, VN40AF, VN35AA, VN35AB, 2N6656, 2N6657, 2N6658, 2N6659, 2N6660, 2N6661

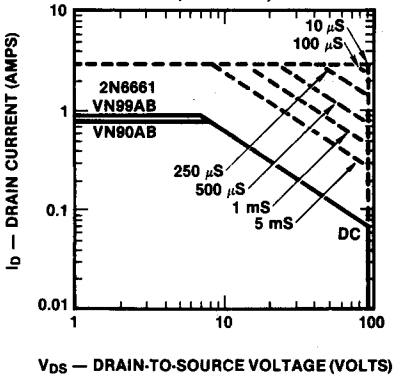
Power Derating



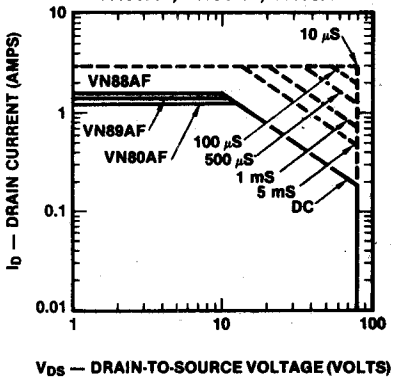
Safe Operating Area VN99AA, VN90AA, 2N6658



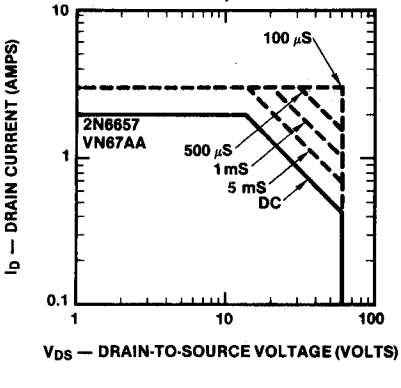
Safe Operating Area VN99AB, VN90AB, 2N6661



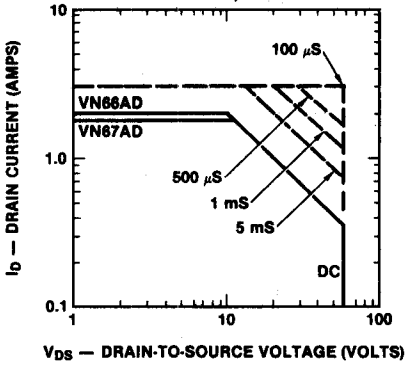
Safe Operating Area VN89AF, VN88AF, VN80AF



Safe Operating Area VN67AA, 2N6657



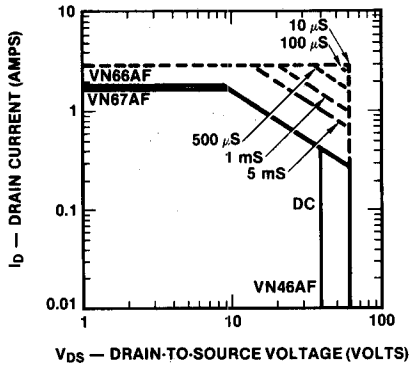
Safe Operating Area VN66AD, VN67AD



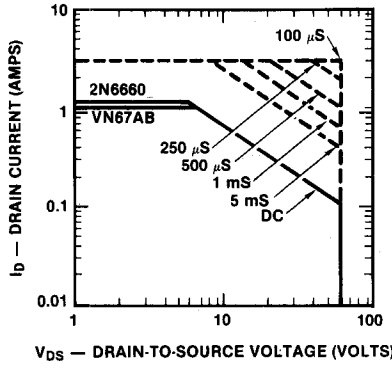
TYPICAL CHARACTERISTICS (Cont'd)

Part Numbers: VN99AA, VN99AB, VN90AA, VN90AB, VN89AD, VN89AF, VN88AD, VN88AF, VN80AF, VN0808M, VN67AA, VN67AD, VN67AB, VN67AF, VN66AD, VN66AF, VN0606M, VN46AD, VN46AF, VN40AD, VN40AF, VN35AA, VN35AB, 2N6656, 2N6657, 2N6658, 2N6659, 2N6660, 2N6661

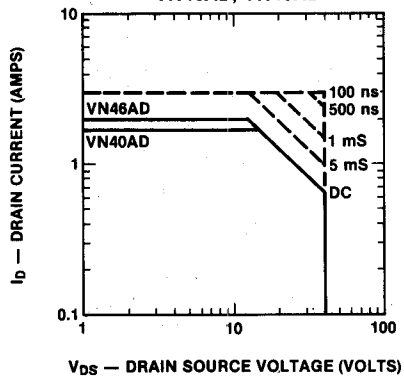
Safe Operating Area
VN66AF, VN67AF



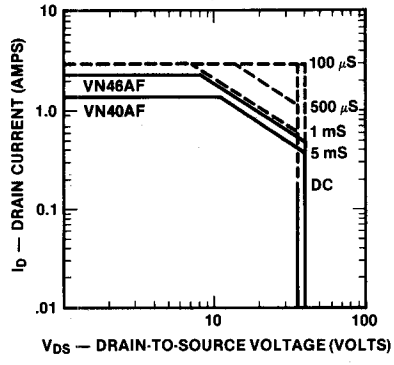
Safe Operating Area
VN67AB, 2N6660



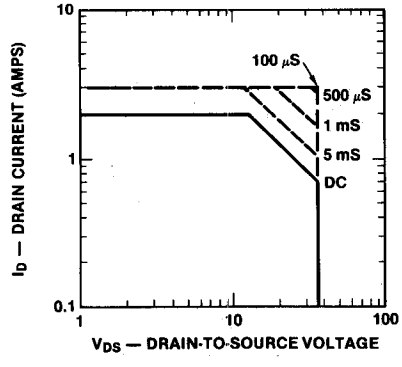
Safe Operating Area
VN46AD, VN40AD



Safe Operating Area
VN46AF, VN40AF



Safe Operating Area
2N6656, VN35AA



Safe Operating Area
2N6659, VN35AB