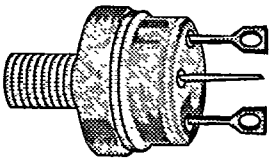
Siliconix incorporated

2N6964 T-39-13

N-Channel Enhancement Mode Transistor
QPL product is in accordance with MIL-S-19500/568

TO-210AC (TO-61)
Isolated Case
This device contains beryllium oxide



TOP VIEW

1 SOURCE
2 GATE
3 DRAIN

PRODUCT SUMMARY

$V_{(BR)DSS}$ (V)	$r_{DS(ON)}$ (Ω)	I_D (A)
400	0.30	15

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

PARAMETERS/TEST CONDITIONS		SYMBOL	LIMITS	UNITS
Drain-Source Voltage		V_{DS}	400	V
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current	T_C = 25°C	I_D	15	A
	T_C = 100°C		9.5	
Pulsed Drain Current[1]		I_{DM}	60	
Power Dissipation	T_C = 25°C	P_D	150	W
	T_C = 100°C		60	
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	

4

THERMAL RESISTANCE RATINGS

THERMAL RESISTANCE	SYMBOL	TYPICAL	MAXIMUM	UNITS
Junction-to-Case	R_{thJC}		0.83	K/W
Junction-to-Ambient	R_{thJA}		40	
Case-to-Sink	R_{thCS}	0.4		

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

2N6964

Siliconix incorporated

T-39-13

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

PARAMETER	SYMBOL	TEST CONDITIONS	TYP	LIMITS MIN	LIMITS MAX	UNIT
STATIC						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA		400		V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 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} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 0 V			250	µA
		V_{DS} = 0.8 x $V_{(BR)DSS}$, V_{GS} = 0 V, T_J = 125°C			250	
On-State Drain Current[1]	$I_{D(ON)}$	V_{DS} = 4.5 V, V_{GS} = 10 V		15		A
Drain-Source On-State Resistance[1]	$r_{DS(ON)}$	V_{GS} = 10 V, I_D = 9 A	0.22		0.30	Ω
		V_{GS} = 10 V, I_D = 9 A, T_J = 125°C	0.40		0.66	
Forward Transconductance[1]	g_{fs}	V_{DS} = 15 V, I_D = 9 A	8.5	8	24	S
DYNAMIC						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz	2700			pF
Output Capacitance	C_{oss}		450			
Reverse Transfer Capacitance	C_{rss}		160			
Total Gate Charge[2]	Q_g	V_{DS} = 0.5 x $V_{(BR)DSS}$, V_{GS} = 10 V, I_D = 15 A	85	52	110	nC
Gate-Source Charge[2]	Q_{gs}		14	5.3	18	
Gate-Drain Charge[2]	Q_{gd}		45	25	65	
Turn-On Delay Time[2]	$t_{d(on)}$	V_{DD} = 180 V, R_L = 20 Ω, I_D ≃ 9 A, V_{GEN} = 10 V, R_G = 4.7 Ω	14		35	ns
Rise Time[2]	t_r		30		60	
Turn-Off Delay Time[2]	$t_{d(off)}$		54		150	
Fall Time[2]	t_f		15		75	
SOURCE-DRAIN DIODE RATINGS AND CHARACTERISTICS (T_C = 25°C)						
Continuous Current	I_S				15	A
Pulsed Current[3]	I_{SM}				56	
Forward Voltage[1]	V_{SD}	I_F = I_S, V_{GS} = 0 V		0.6	1.7	V
Reverse Recovery Time	t_{rr}	I_F = I_S, dI_F/dt = 100 A/µs	300		800	ns
Reverse Recovery Charge	Q_{rr}		2.0			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).

TYPICAL CHARACTERISTICS (25°C Unless Otherwise Specified)

T-39-13

Figure 1. Output Characteristics

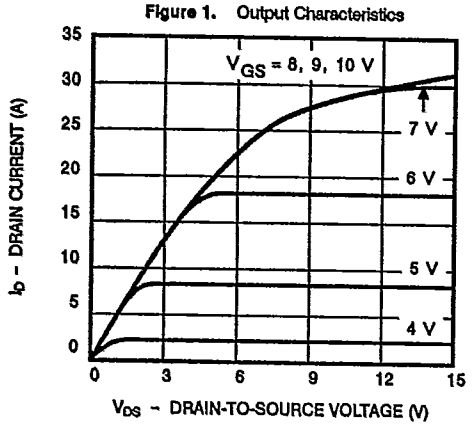


Figure 2. Transfer Characteristics

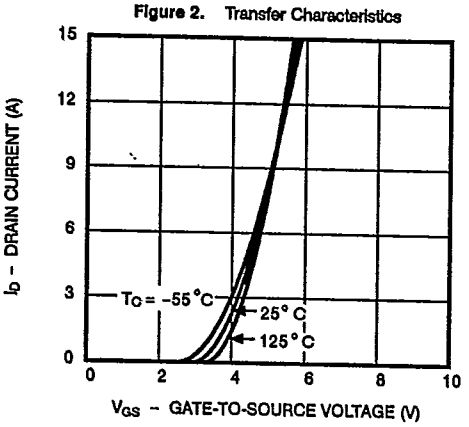


Figure 3. Transconductance

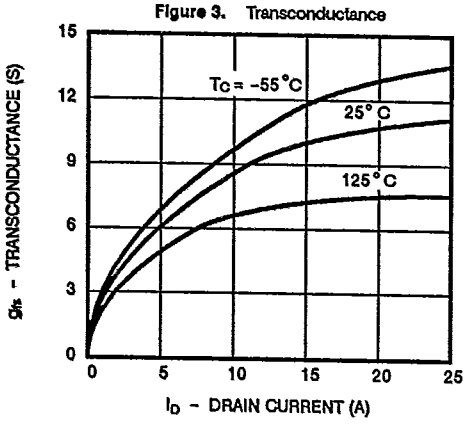


Figure 4. On-Resistance

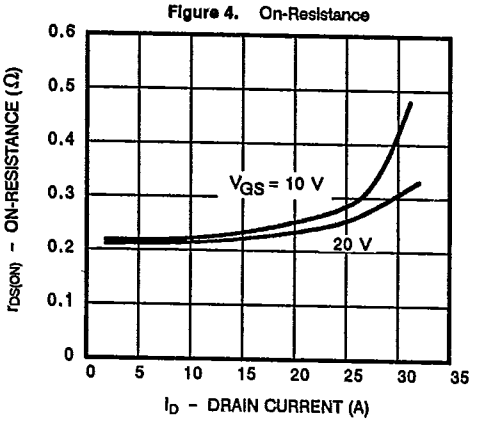


Figure 5. Capacitance

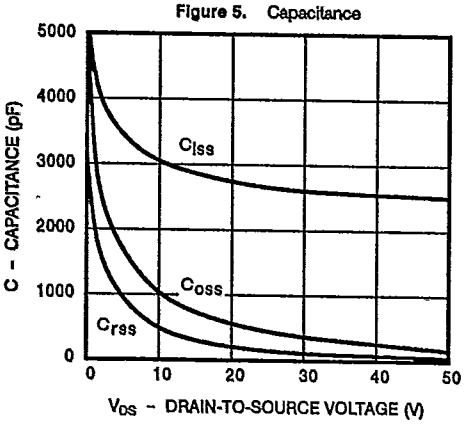
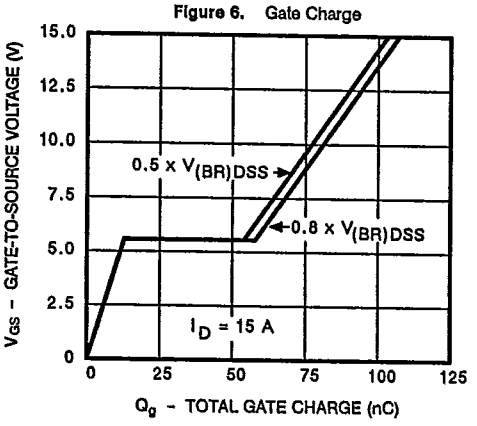


Figure 6. Gate Charge



4

TYPICAL CHARACTERISTICS (Cont'd)

T-39-13

Figure 7. On-Resistance vs. Junction Temperature

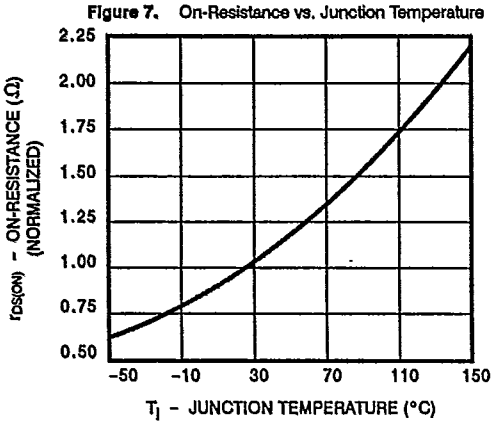
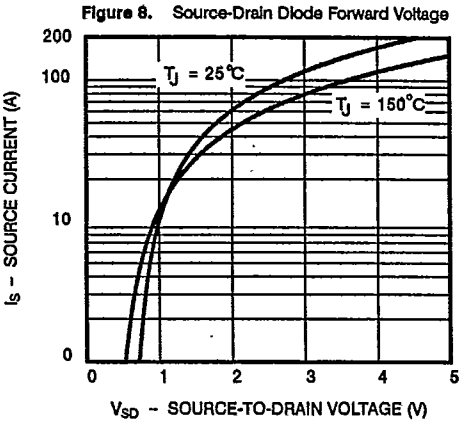


Figure 8. Source-Drain Diode Forward Voltage



THERMAL RATINGS

Figure 9. Maximum Drain Current vs. Case Temperature

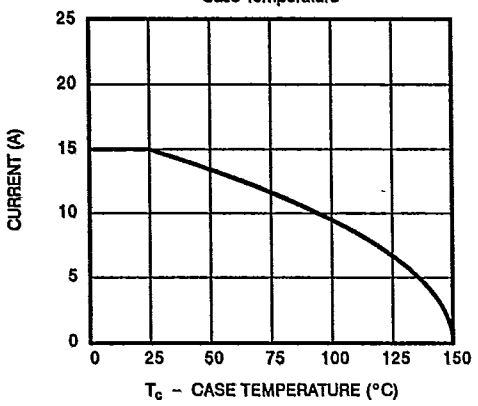
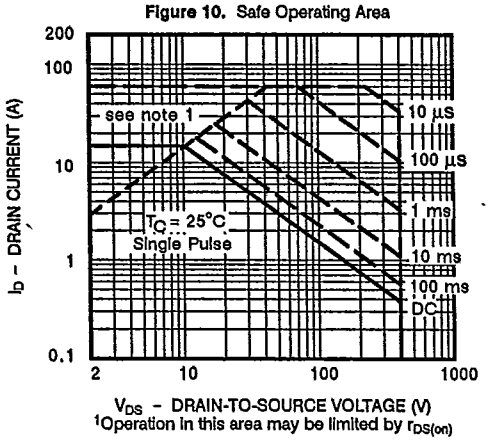


Figure 10. Safe Operating Area



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

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