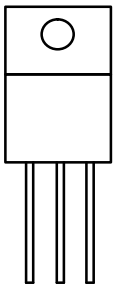
2N7078

N-Channel Enhancement-Mode Transistor

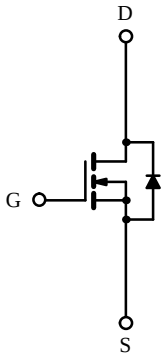
Product Summary

$V_{(BR)DSS}$ (V)	$r_{DS(on)}$ (Ω)	I_D (A)
500	0.40	13

TO-254AA
Hermetic Package



Top View



N-Channel MOSFET

Absolute Maximum Ratings (T_C = 25°C Unless Otherwise Noted)

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		V_{DS}	500	V
Gate-Source Voltage		V_{GS}	± 20	
Continuous Drain Current (T_J = 150°C)	T_C = 25°C	I_D	13	A
	T_C = 100°C		8.0	
Pulsed Drain Current		I_{DM}	50	
Maximum Power Dissipation	T_C = 25°C	P_D	150	W
	T_C = 100°C		60	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	–55 to 150	°C
Lead Temperature ($^1/_{16}$" from case for 10 sec.)		T_L	300	

Thermal Resistance Ratings

Parameter	Symbol	Typical	Maximum	Unit
Maximum Junction-to-Ambient	R_{thJA}		50	°C/W
Maximum Junction-to-Case	R_{thJC}		0.83	
Case-to-Sink	R_{thCS}	0.2		

Subsequent updates to this data sheet may be obtained via facsimile by calling Siliconix FaxBack, 1-408-970-5600. Please request FaxBack document #1455 .

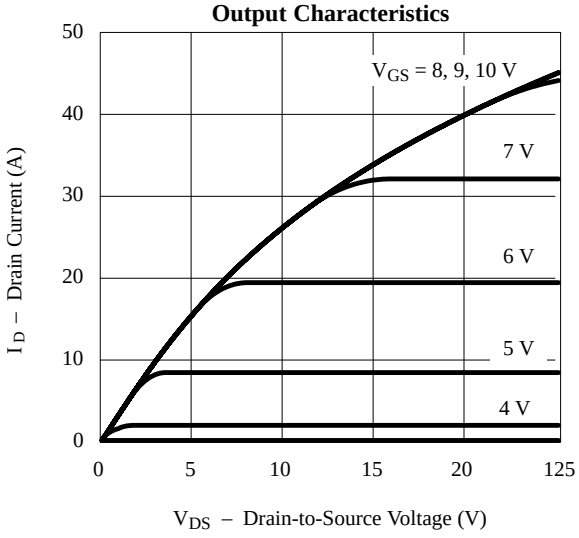
Specifications (T_J = 25°C Unless Otherwise Noted)

Parameter	Symbol	Test Condition	Limit			Unit
			Min	Typ[a]	Max	
Static						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 µA	500			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} = 400 V, V_{GS} = 0 V			25	µA
		V_{DS} = 400 V, V_{GS} = 0 V, T_J = 125°C			250	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} = 10 V, V_{GS} = 10 V	13.0			A
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 8.0 A		0.31	0.40	Ω
		V_{GS} = 10 V, I_D = 8.0 A, T_J = 125°C		0.67	0.90	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 8.0 A	8.0	10	24	S
Dynamic						
Input Capacitance	C_{iss}	V_{GS} = 0 V, V_{DS} = 25 V, f = 1 MHz		2700		pF
Output Capacitance	C_{oss}			500		
Reverse Transfer Capacitance	C_{rss}			140		
Total Gate Charge[c]	Q_g	V_{DS} = 250 V, V_{GS} = 10 V, I_D = 13 A		75	120	nC
Gate-Source Charge[c]	Q_{gs}			12	19	
Gate-Drain Charge[c]	Q_{gd}			35	70	
Turn-On Delay Time[c]	$t_{d(on)}$	V_{DD} = 250 V, R_L = 13 Ω I_D ≅ 13 A, V_{GEN} = 10 V, R_G = 2.4 Ω		13	35	ns
Rise Time[c]	t_r			26	50	
Turn-Off Delay Time[c]	$t_{d(off)}$			55	150	
Fall Time[c]	t_f			17	70	
Source-Drain Diode Ratings and Characteristics						
Continuous Current	I_S				13	A
Pulsed Current	I_{SM}				50	
Diode Forward Voltage[b]	V_{SD}	I_F = 13 A, V_{GS} = 0 V	0.80		1.6	V
Reverse Recovery Time	t_{rr}	I_F = 13 A, di/dt = 100 A/µs		400	1000	ns
Reverse Recovery Charge	Q_{rr}			2.0		µC

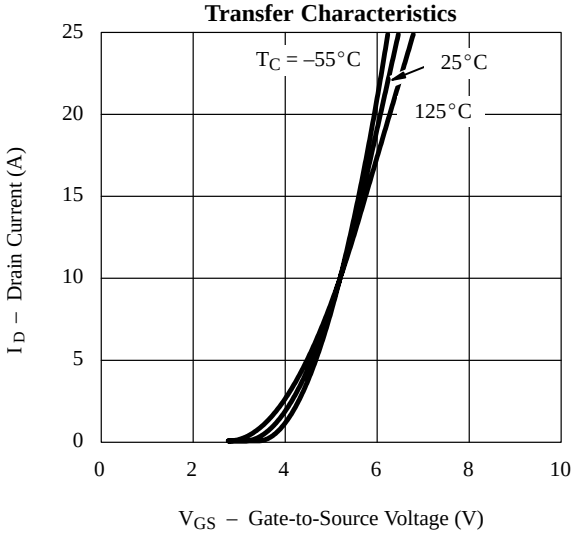
Notes:
a. For design aid only; not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.
c. Independent of operating temperature.

Typical Characteristics (25°C Unless Otherwise Noted)

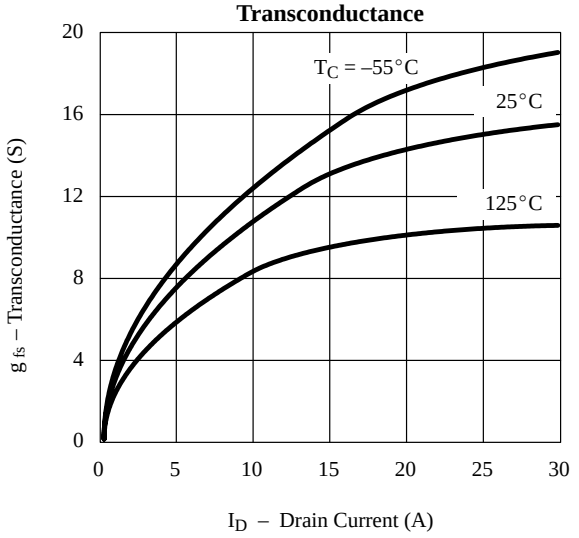
Output Characteristics



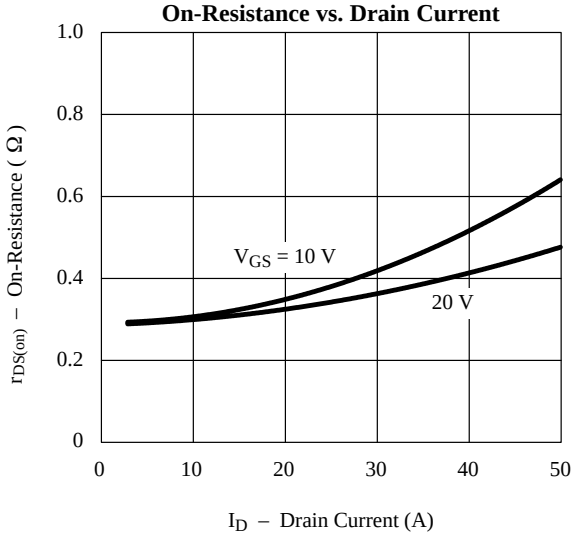
Transfer Characteristics



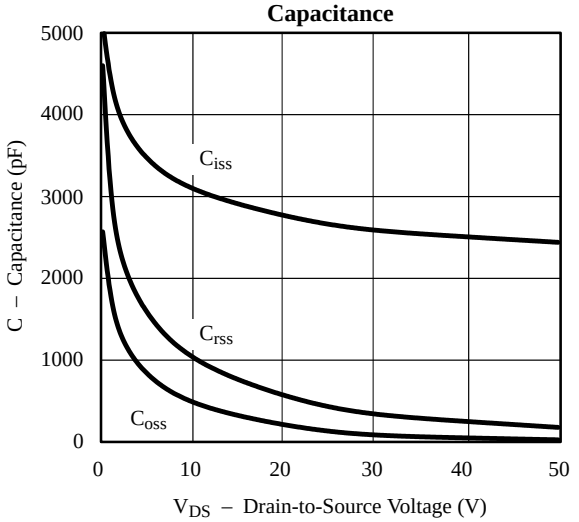
Transconductance



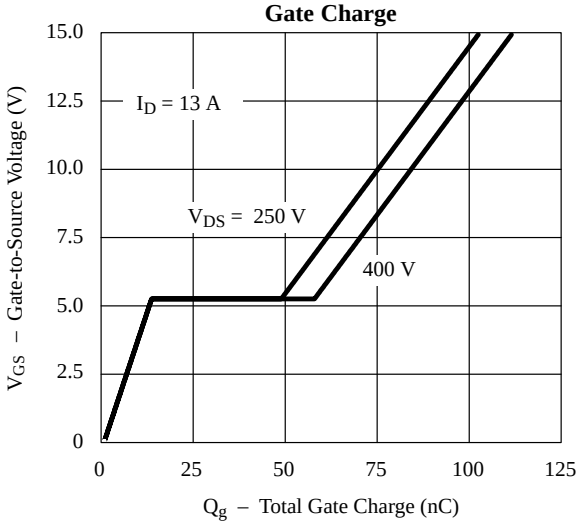
On-Resistance vs. Drain Current



Capacitance

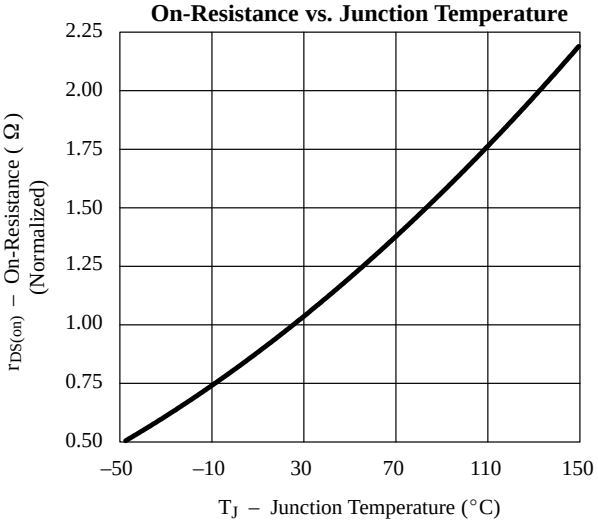


Gate Charge

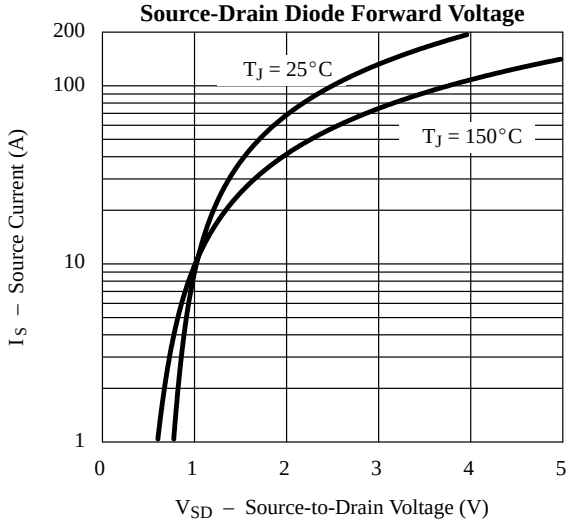


Typical Characteristics (25°C Unless Otherwise Noted)

On-Resistance vs. Junction Temperature

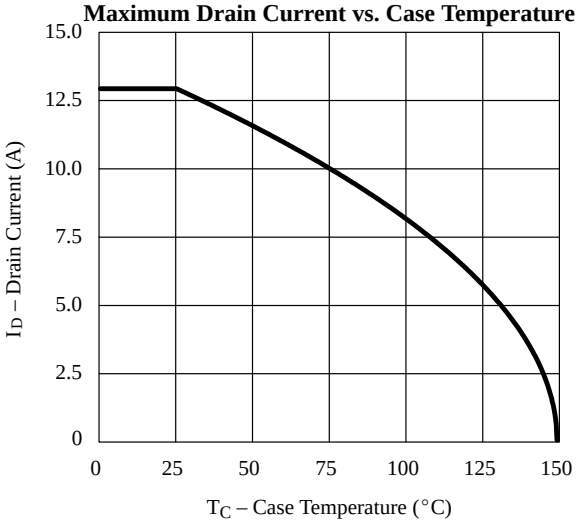


Source-Drain Diode Forward Voltage

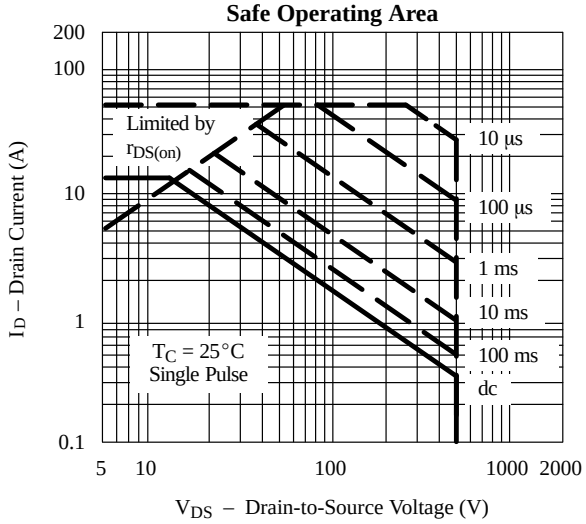
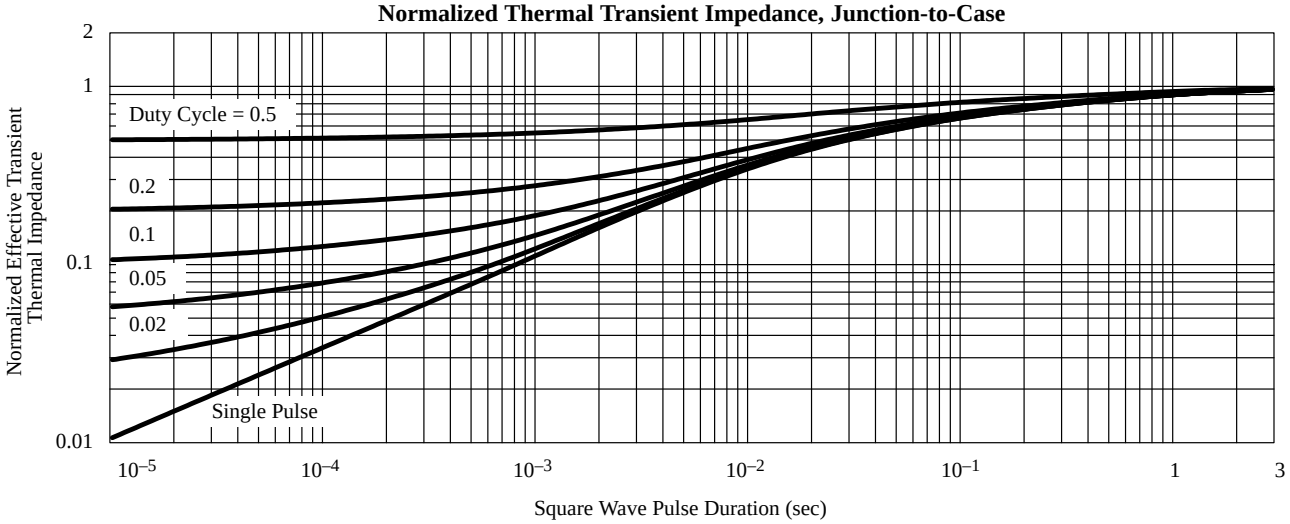


Thermal Ratings

Maximum Drain Current vs. Case Temperature



Safe Operating Area



Normalized Thermal Transient Impedance, Junction-to-Case