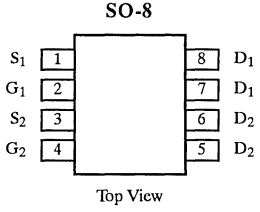
Siliconix

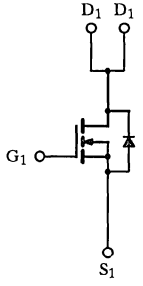
Si9943DY

Dual Enhancement-Mode MOSFET (N- and P-Channel)

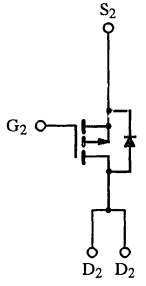
Product Summary

	V_{DS} (V)	$r_{DS(on)}$ (Ω)	I_D (A)
N-Channel	20	0.125 @ V_{GS} = 10 V	±3.0
		0.250 @ V_{GS} = 4.5 V	±2.0
P-Channel	−20	0.160 @ V_{GS} = −10 V	±2.8
		0.300 @ V_{GS} = −4.5 V	±2.0





N-Channel MOSFET



P-Channel MOSFET

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

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	20	−20	V
Gate-Source Voltage		V_{GS}	±20	±20	
Continuous Drain Current (T_J = 150°C)	T_A = 25°C	I_D	±3.0	±2.8	A
	T_A = 70°C		±2.5	±2.3	
Pulsed Drain Current		I_{DM}	±10	±10	
Continuous Source Current (Diode Conduction)		I_S	1.6	−1.6	
Maximum Power Dissipation (Surface Mounted on FR4 Board)	T_A = 25°C	P_D	2.0		W
	T_A = 70°C		1.3		
Operating Junction and Storage Temperature Range		T_J, T_{stg}	−55 to 150		°C

Thermal Resistance Ratings

Parameter	Symbol	N- or P-Channel	Unit
Maximum Junction-to-Ambient (Surface Mounted on FR4 Board)	R_{thJA}	62.5	°C/W

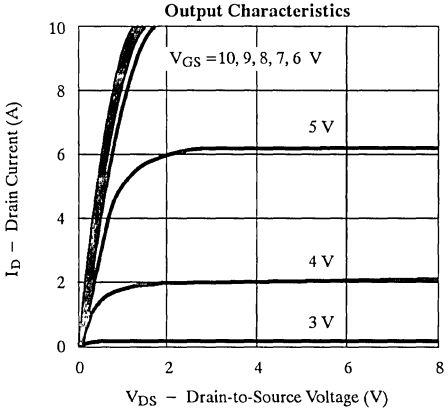
Specifications (T_J = 25°C Unless Otherwise Noted)

Parameter	Symbol	Test Condition		Min	Typ[a]	Max	Unit
Static							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250 µA	N-Ch	1.0			V
		V_{DS} = V_{GS}, I_D = −250 µA	P-Ch	−1.0			
Gate-Body Leakage	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±20 V				±100	nA
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS} = 16 V, V_{GS} = 0 V	N-Ch			2	µA
		V_{DS} = −16 V, V_{GS} = 0 V	P-Ch			−2	
		V_{DS} = 16 V, V_{GS} = 0 V, T_J = 55°C	N-Ch			25	
		V_{DS} = −16 V, V_{GS} = 0 V, T_J = 55°C	P-Ch			−25	
On-State Drain Current[b]	$I_{D(on)}$	V_{DS} ≥ 5 V, V_{GS} = 10 V	N-Ch	10			A
		V_{DS} ≤ −5 V, V_{GS} = −10 V	P-Ch	−10			
		V_{DS} ≥ 5 V, V_{GS} = 4.5 V	N-Ch	2			
		V_{DS} ≤ −5 V, V_{GS} = −4.5 V	P-Ch	−2			
Drain-Source On-State Resistance[b]	$r_{DS(on)}$	V_{GS} = 10 V, I_D = 3.0 A	N-Ch		0.100	0.125	Ω
		V_{GS} = −10 V, I_D = 3.0 A	P-Ch	0.100	0.130	0.160	
		V_{GS} = 6 V, I_D = 2.0 A	N-Ch		0.120	0.160	
		V_{GS} = − 6 V, I_D = 2.0 A	P-Ch	0.120	0.160	0.200	
		V_{GS} = 4.5 V, I_D = 1.5 A	N-Ch		0.160	0.250	
		V_{GS} = −4.5 V, I_D = 1.5 A	P-Ch		0.20	0.300	
Forward Transconductance[b]	g_{fs}	V_{DS} = 15 V, I_D = 3.0 A	N-Ch		3.7		S
		V_{DS} = −15 V, I_D = −3.0 A	P-Ch		3.0		
Diode Forward Voltage[b]	V_{SD}	I_S = 1.25 A, V_{GS} = 0 V	N-Ch		0.9	1.2	V
		I_S = −1.25 A, V_{GS} = 0 V	P-Ch		−1.4	−1.6	
Dynamic[a]							
Total Gate Charge	Q_g	N-Channel V_{DS} = 10 V, V_{GS} = 10 V, I_D = 2.3 A P-Channel V_{DS} = −10 V, V_{GS} = −10 V, I_D = −2.3 A	N-Ch		5.2	25	nC
			P-Ch		9.4	25	
Gate-Source Charge	Q_{gs}		N-Ch		0.8		
			P-Ch		1.3		
Gate-Drain Charge	Q_{gd}		N-Ch		2.0		
			P-Ch		2.0		
Turn-On Delay Time	$t_{d(on)}$	N-Channel V_{DD} = 20 V, R_L = 20 Ω, I_D ≅ 1 A, V_{GEN} = 10 V, R_G = 6 Ω P-Channel V_{DD} = −20 V, R_L = 20 Ω, I_D ≅ −1 A, V_{GEN} = −10 V, R_G = 6 Ω	N-Ch		5	15	ns
			P-Ch		12	40	
Rise Time	t_r		N-Ch		10	20	
			P-Ch		19	40	
Turn-Off Delay Time	$t_{d(off)}$		N-Ch		25	50	
			P-Ch		42	90	
Fall Time	t_f		N-Ch		22	50	
			P-Ch		27	50	
Source-Drain Reverse Recovery Time	t_{rr}	I_F = 1.25 A, di/dt = 100 A/µs	N-Ch		69	100	
			P-Ch		69	100	

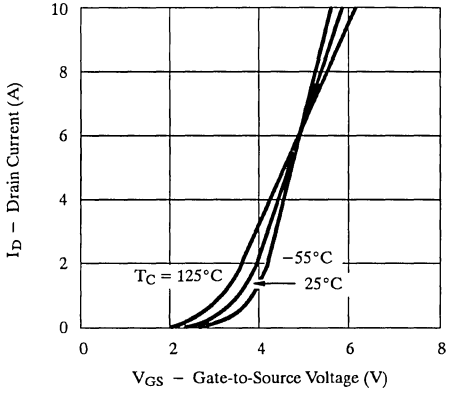
Notes
a. Guaranteed by design, not subject to production testing.
b. Pulse test; pulse width ≤ 300 µs, duty cycle ≤ 2%.

Typical Characteristics (25°C Unless Otherwise Noted) N-Channel

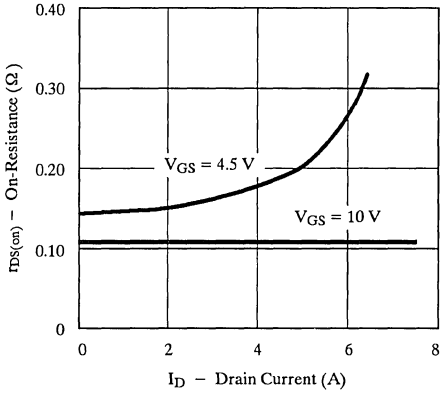
Output Characteristics



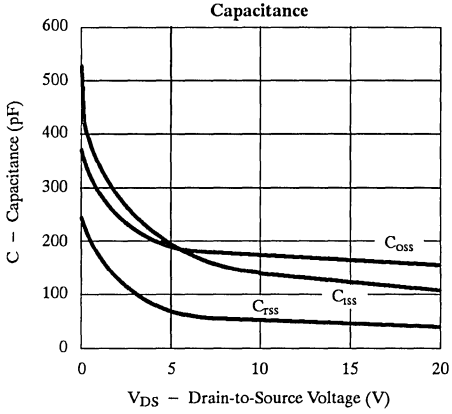
Transfer Characteristics



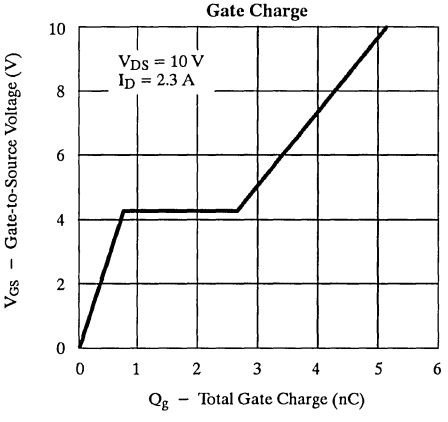
On-Resistance vs. Drain Current



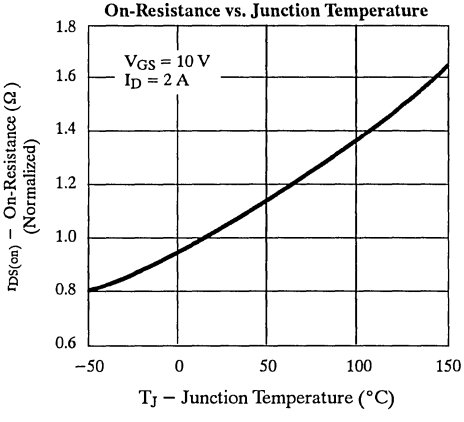
Capacitance



Gate Charge

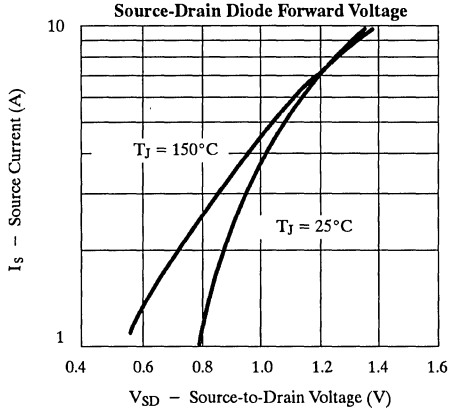


On-Resistance vs. Junction Temperature

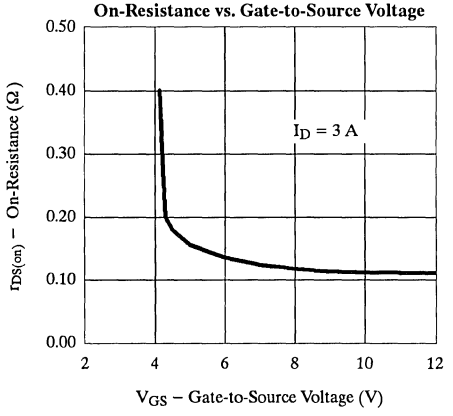


Typical Characteristics (25°C Unless Otherwise Noted) N-Channel

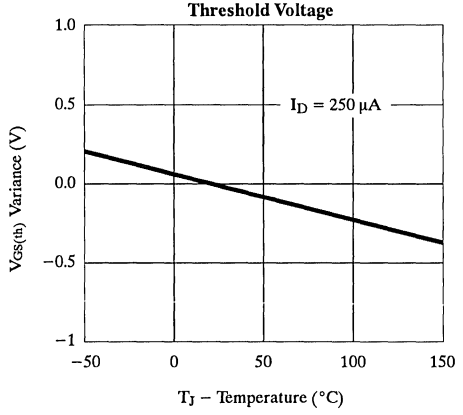
Source-Drain Diode Forward Voltage



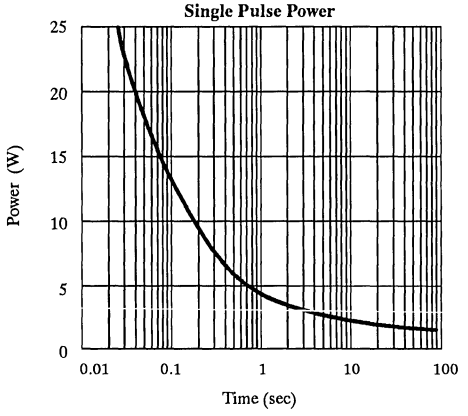
On-Resistance vs. Gate-to-Source Voltage



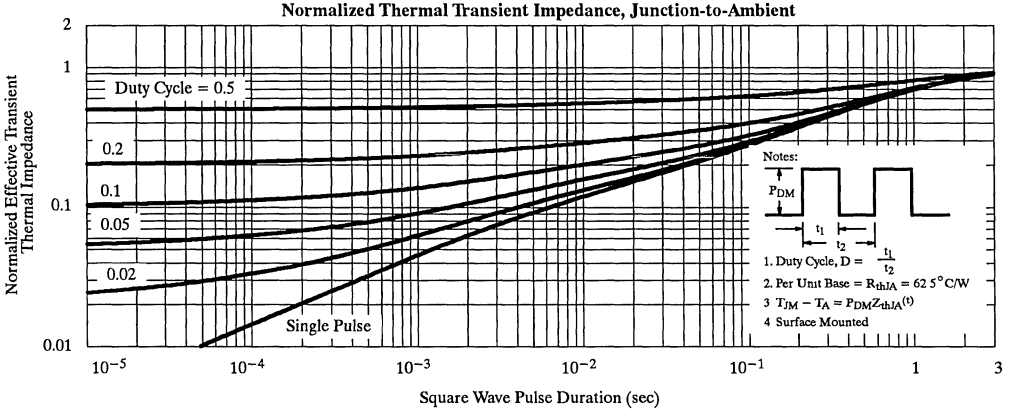
Threshold Voltage



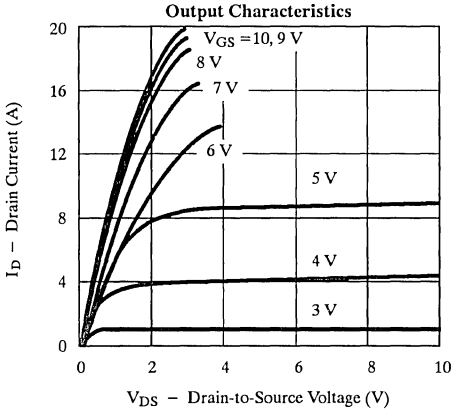
Single Pulse Power

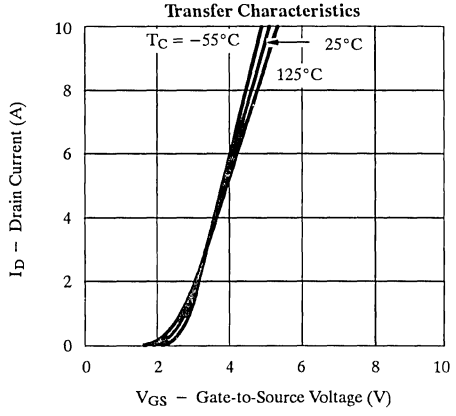


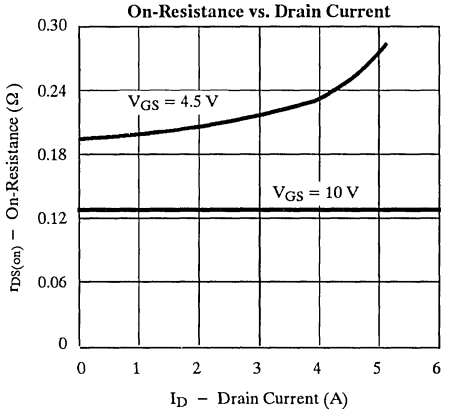
Normalized Thermal Transient Impedance, Junction-to-Ambient

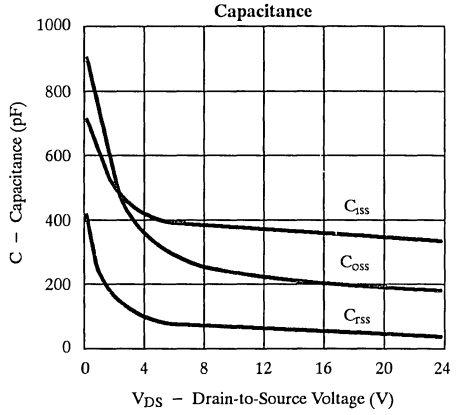


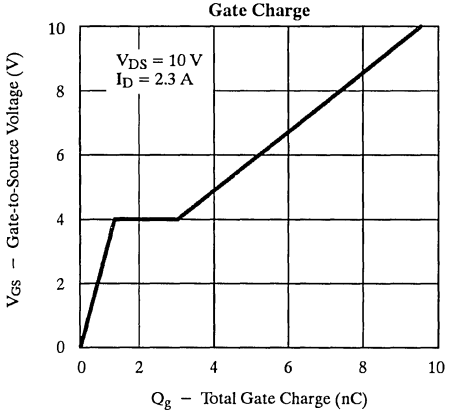
Typical Characteristics (25°C Unless Otherwise Noted) P-Channel

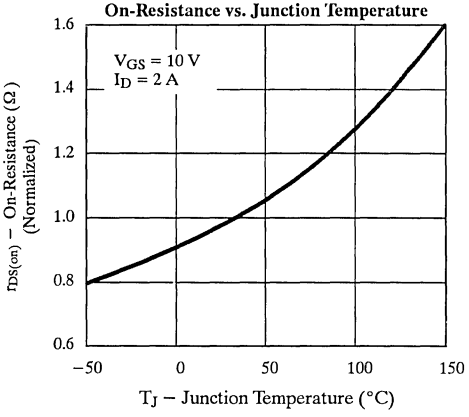








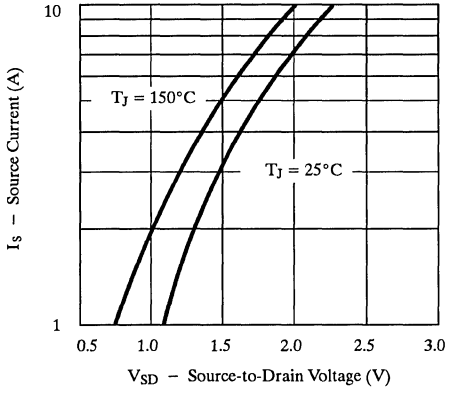




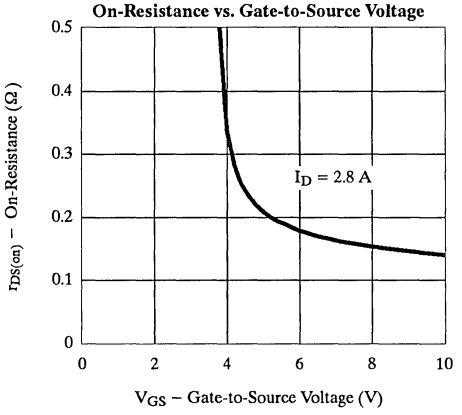
Typical Characteristics (25°C Unless Otherwise Noted)

P-Channel

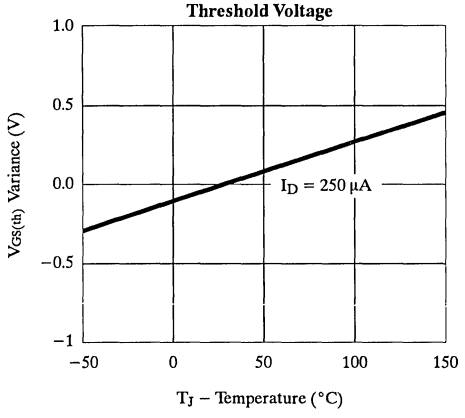
Source-Drain Diode Forward Voltage



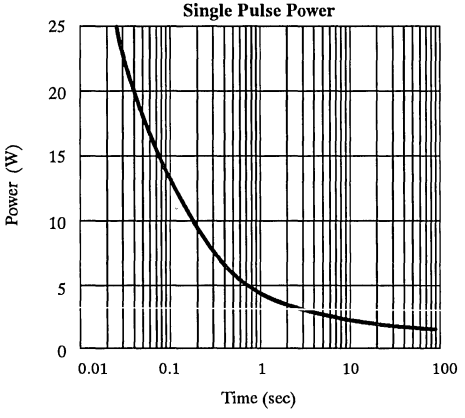
On-Resistance vs. Gate-to-Source Voltage



Threshold Voltage



Single Pulse Power



Normalized Thermal Transient Impedance, Junction-to-Ambient