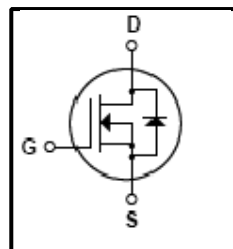


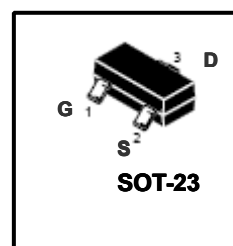
500V N-Channel Depletion-Mode DMOSFET
Features

- 30mA, 500V, $R_{DS(on)}$ (Max750Ω)@ $V_{GS}=0, I_D=3.0mA$
- Free from secondary breakdown
- Low power drive requirement
- Integral source-drain diode
- Ease of paralleling
- Excellent thermal stability
- High input impedance and low C_{ISS}


General Description

The WFY03DN50 is a high voltage N-channel depletion mode (normally-on) transistor utilizing Winsemi's lateral DMOS technology.

The WFY03DN50 is ideal for high voltage applications in the areas of normally-on switches, precision constant current sources, voltage ramp generation and amplification.


Absolute Maximum Ratings ($T_c=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Value		Units
		Min	Max	
V_{DSS}	Drain Source Voltage		500	V
I_D	Continuous Drain Current(Note 1)		30	mA
		$T_c=75^\circ\text{C}$	24	
I_{DM}	Drain Current Pulsed		120	mA
P_D	Total Power Dissipation		0.5	W
V_{GS}	Gate to Source Voltage		± 20	V
dv/dt	Peak Diode Recovery Voltage Rising Rate		5	V/ns
T_J	Junction Temperature		150	$^\circ\text{C}$
T_{stg}	Storage Temperature		-55~150	
T_L	Maximum lead Temperature for soldering purposes		300	$^\circ\text{C}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

Thermal Characteristics

Symbol	Parameter	Value			Units
		Min	Typ	Max	
R_{QJA}	Thermal Resistance, Junction-to-Ambient(Note 2)	-	-	250	$^\circ\text{C}/\text{W}$
R_{QJC}	Thermal Resistance, Junction-to-Case(Note 2)			200	$^\circ\text{C}/\text{W}$

Note 1: I_D (continuous) is limited by max rated T_J .

Note 2: Mounted on FR4 board, 25mm x 25mm x 1.57mm

Electrical Characteristics (T_c = 25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit	
OFF Characteristics							
Gate leakage current	I _{GSS}	V _{GS} = ±20 V, V _{DS} = 0 V	-	-	±100	nA	
Drain cut-off current	I _{DSS}	V _{DS} = 500 V, V _{GS} = -5 V T _c =125°C	-	-	0.1 10	μA	
Drain-source breakdown voltage	V _{(BR)DSS}	I _D = 250 μA, V _{GS} = 0 V	500	-	-	V	
On Characteristics							
Drain on-sta current	I _D	V _{DS} = 25V V _{GS} = 0V	1	-	-	mA	
Gate-Source off voltage	V _{GS(off)}	V _{DS} = 25V I _D =100nA	-3	-2	-1	V	
Drain-Source ON resistance	R _{DS(ON)}	V _{GS} = 0 V, I _D = 0.5mA	-	350	750	Ω	
		V _{GS} = 10 V, I _D = 16mA		360	850		
Dynamic Characteristics							
Forward Transconductance	g _{fs}	V _{DS} = 0 V, I _D = 1mA	1	2	-	mS	
Input capacitance	C _{iss}	V _{GS} = -10V,	-	7.5	10	pF	
Reverse transfer capacitance	C _{rss}	V _{DS} = 25V,	-	0.5	1.0		
Output capacitance	C _{oss}	f = 1.0MHz	-	2.0	3.5		
Switching Characteristics							
Switching time (Note 4)	Turn-on Delay time	t _{d(on)}	I _D = 10mA V _{DD} = 300V V _{GS} = -5 ~ 7V R _G = 6.0Ω	-	6.2	-	ns
	Turn-on Rise time	t _r		-	53	-	
	Turn-off Delay time	t _{d(off)}		-	56	-	
	Turn-off Fall time	t _f		-	128	-	
Total gate charge	Q _g	I _D = 10mA	-	1.1	-	nC	
Gate-source charge	Q _{gs}	V _{DD} = 400V	-	0.5	-		
Gate-drain ("miller") Charge	Q _{gd}	V _{GS} = -5V ~ 5V	-	0.3	-		

Source-Drain Ratings and Characteristics (T_a = 25°C)

Characteristics	Symbol	Test Condition	Min	Type	Max	Unit
Continuous drain reverse current	I _{DR}	-	-	-	25	mA
Pulse drain reverse current	I _{DRP}	-	-	-	100	mA
Forward voltage (diode)	V _{DSF}	I _{DR} =1mA, V _{GS} = -10V	-	0.76	0.9	V
Reverse Recovery Time	t _{rr}	I _{DR} =1mA, V _{GS} = -10V dI _{DR} /dt=100A/us	-	200	-	ns
Reverse Recovery Charge	Q _{rr}		-	636	-	nC
Reverse Recovery Current	I _{RRM}		-	5.3	-	A

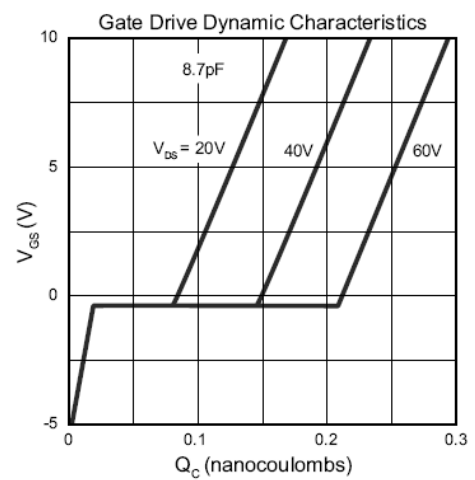
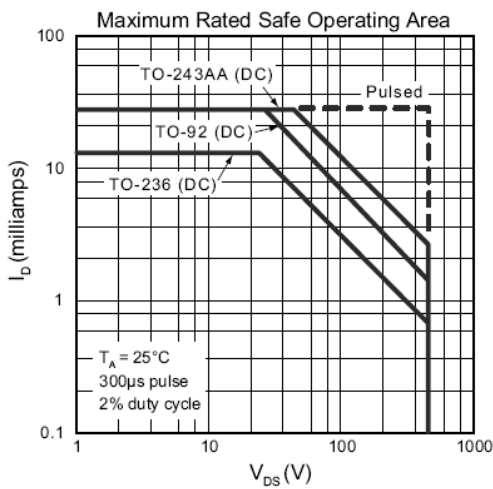
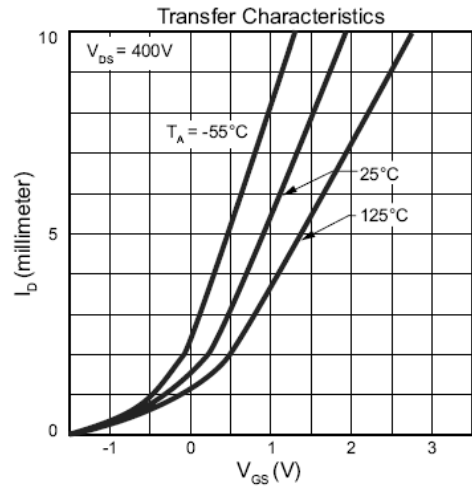
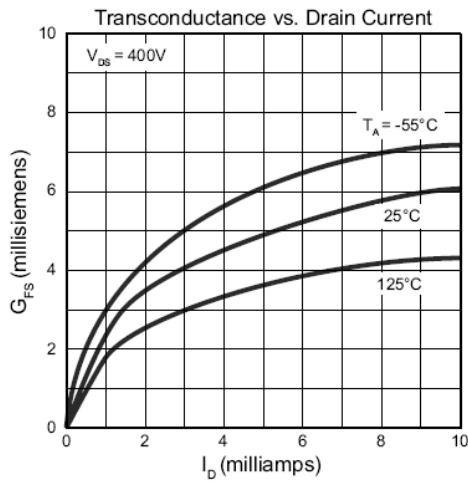
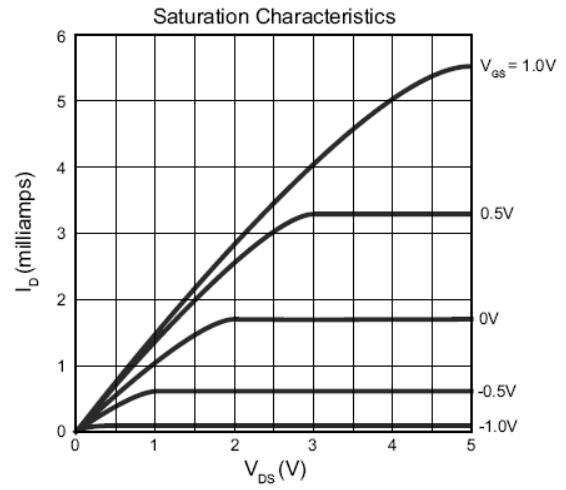
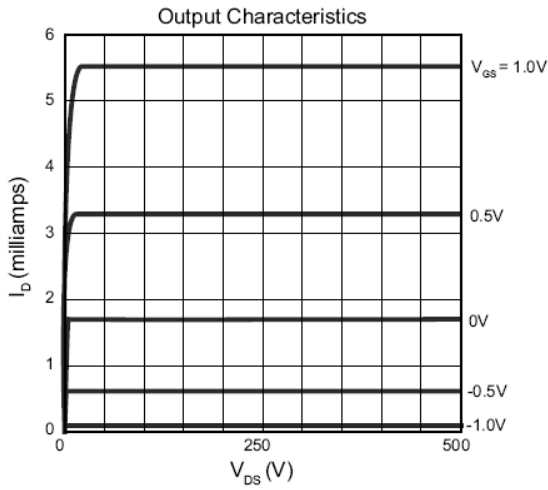
Note 3: Pulse Test: Pulse Width ≤300μs, Duty Cycle 3 2%.

Note 4: Switching characteristics are independent of operating junction temperature.

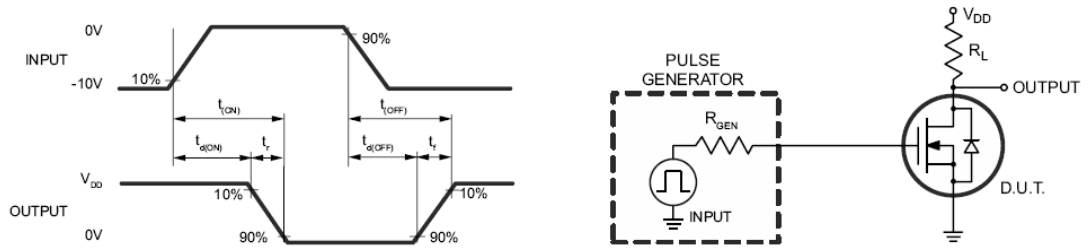
This transistor is an electrostatic sensitive device

Please handle with caution

Typical Performance Cures



Switching Waveforms and Test Circuit



SOT-23 Package Dimension

DIM	MILLIMETERS		INCHES	
	MIN	MAX	MIN	MAX
A	0.95		0.037	
A1	1.90		0.074	
B	2.60	3.00	0.102	0.118
C	1.40	1.70	0.055	0.067
D	2.80	3.10	0.110	0.122
E	1.00	1.30	0.039	0.051
F	0.00	0.10	0.000	0.004
G	0.35	0.50	0.014	0.020
H	0.10	0.20	0.004	0.008
I	0.30	0.60	0.012	0.024
J	50°	10°	50°	10°

