

# TSM320N03CX

## 30V N-Channel Power MOSFET

SOT-23



Pin Definition:

1. Gate
2. Source
3. Drain

### Key Parameter Performance

Parameter	Value	Unit
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 4.5V$	32
	$V_{GS} = 2.5V$	40
$Q_g$	8.4	nC

### Features

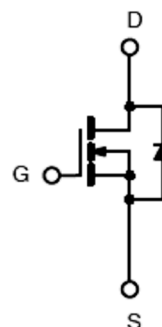
- Improved dv/dt capability
- Fast switching

### Ordering Information

Part No.	Package	Packing
TSM320N03CX RFG	SOT-23	3kpcs / 7+Reel

**Note:** %G+denotes for Halogen- and Antimony-free as those which contain <900ppm bromine, <900ppm chlorine (<1500ppm total Br + Cl) and <1000ppm antimony compounds

### Block Diagram



N-Channel MOSFET

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Continuous Drain Current	$I_D$	$T_C = 25^\circ C$	5.3
		$T_C = 100^\circ C$	3.4
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	21.2	A
Power Dissipation @ $T_C = 25^\circ C$	$P_D$	1.56	W
Operating Junction Temperature	$T_J$	150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Ambient	$R_{JA}$	80	$^\circ C/W$

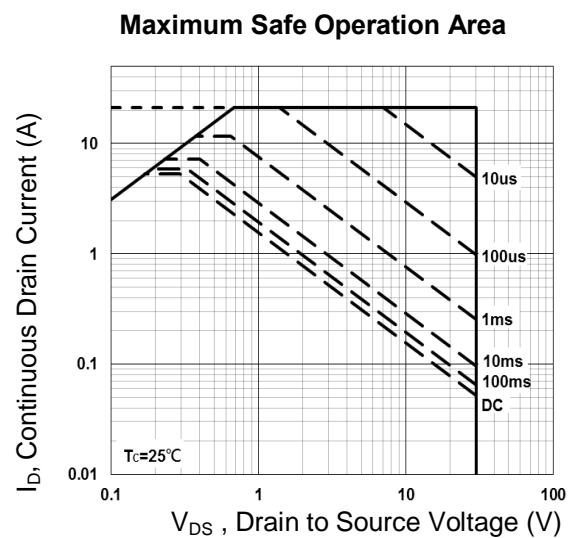
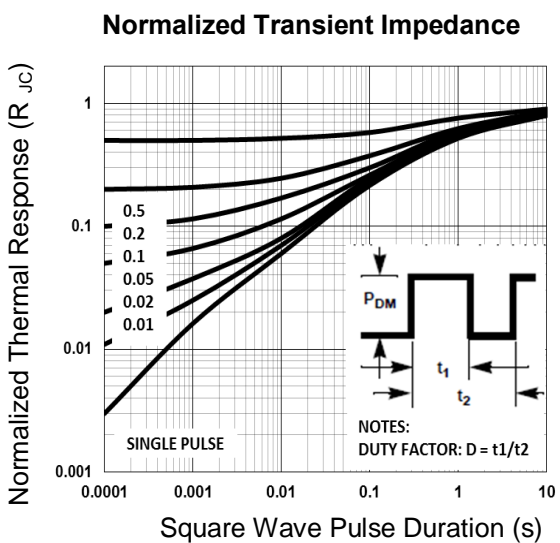
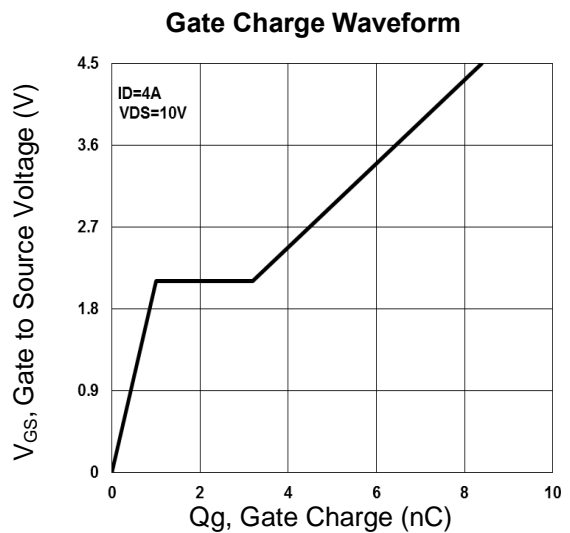
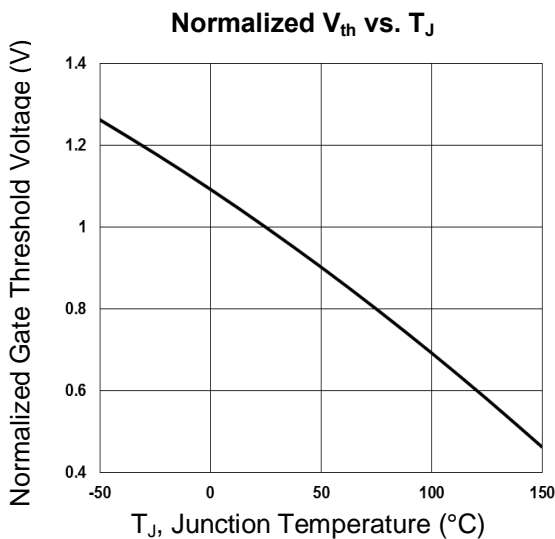
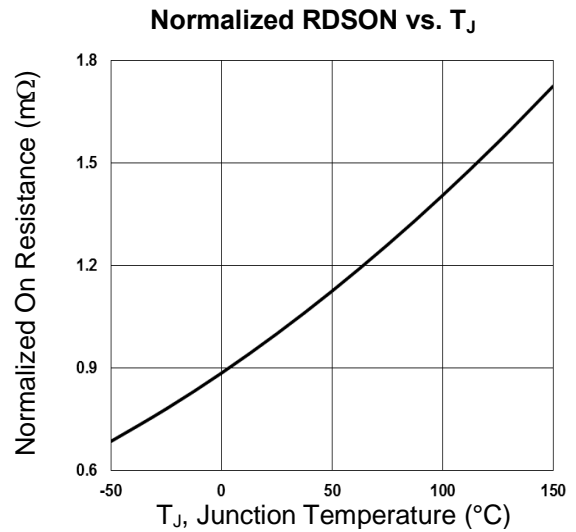
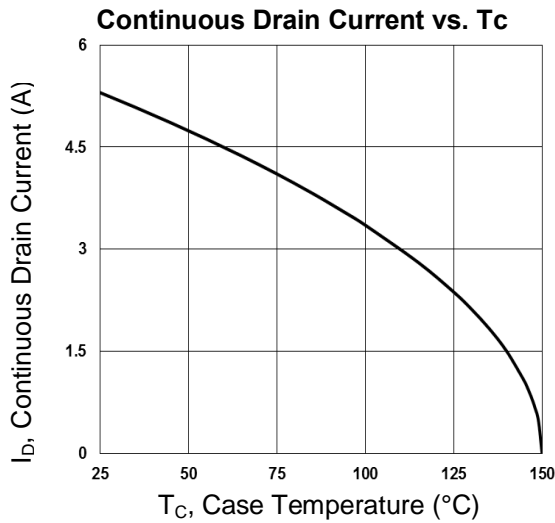
### Electrical Specifications (T<sub>C</sub> = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	BV <sub>DSS</sub>	30	--	--	V
Drain-Source On-State Resistance	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 4A	R <sub>DS(ON)</sub>	--	27	32	m
	V <sub>GS</sub> = 2.5V, I <sub>D</sub> = 3A		--	32	40	
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	V <sub>GS(TH)</sub>	0.4	0.6	0.9	V
Zero Gate Voltage Drain Current	V <sub>DS</sub> = 30V, V <sub>GS</sub> = 0V	I <sub>DSS</sub>	--	--	1	μA
	V <sub>DS</sub> = 24V, T <sub>J</sub> = 125°C		--	--	10	
Gate Body Leakage	V <sub>GS</sub> = ±12V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±100	nA
Forward Transconductance <sup>(Note 2)</sup>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 3A	g <sub>fs</sub>	--	7	--	S
<b>Dynamic</b>						
Total Gate Charge <sup>(Note 2,3)</sup>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 4A, V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	--	8.4	--	nC
Gate-Source Charge <sup>(Note 2,3)</sup>		Q <sub>gs</sub>	--	1	--	
Gate-Drain Charge <sup>(Note 2,3)</sup>		Q <sub>gd</sub>	--	2.2	--	
Input Capacitance	V <sub>DS</sub> = 10V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	695	--	pF
Output Capacitance		C <sub>oss</sub>	--	45	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	36	--	
<b>Switching</b>						
Turn-On Delay Time <sup>(Note 2,3)</sup>	V <sub>DD</sub> = 10V, I <sub>D</sub> = 1A, V <sub>GS</sub> = 4.5V, R <sub>GEN</sub> = 25	t <sub>d(on)</sub>	--	4.5	--	ns
Turn-On Rise Time <sup>(Note 2,3)</sup>		t <sub>r</sub>	--	13	--	
Turn-Off Delay Time <sup>(Note 2,3)</sup>		t <sub>d(off)</sub>	--	27	--	
Turn-Off Fall Time <sup>(Note 2,3)</sup>		t <sub>f</sub>	--	8.3	--	
<b>Source-Drain Diode Ratings and Characteristic</b>						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I <sub>S</sub>	--	--	5.3	A
Maximum Pulse Drain-Source Diode Forward Current		I <sub>SM</sub>	--	--	21.2	A
Diode-Source Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	V <sub>SD</sub>	--	--	1	V

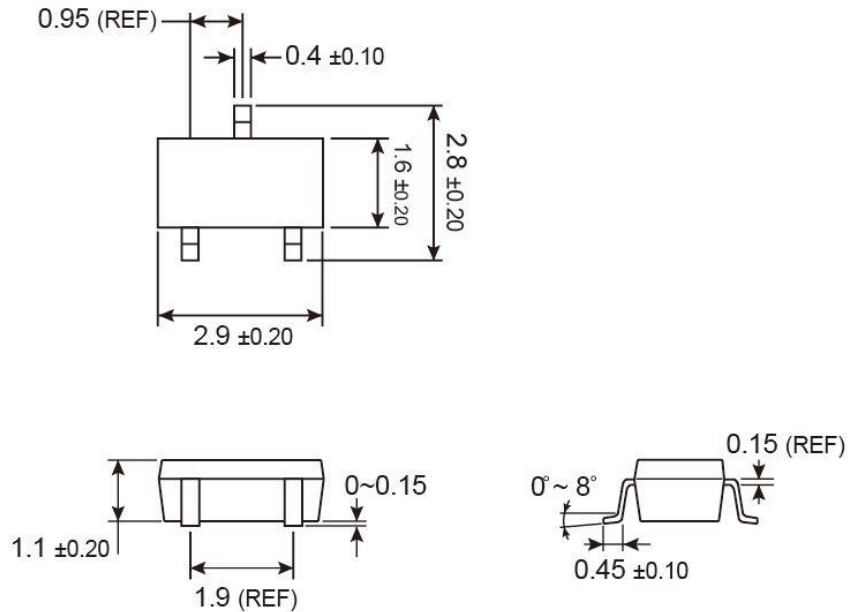
#### Note:

1. Pulse width limited by safe operating area
2. Pulse test: pulse width m300μs, duty cycle m2%
3. Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curves

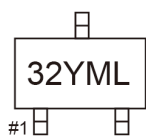


### SOT-23 Mechanical Drawing



Unit: Millimeters

### Marking Diagram



- 32** = Device Code
- Y** = Year Code
- M** = Month Code for Halogen Free Product  
(**O**=Jan, **P**=Feb, **Q**=Mar, **R**=Apr, **S**=May, **T**=Jun, **U**=Jul, **V**=Aug, **W**=Sep, **X**=Oct, **Y**=Nov, **Z**=Dec)
- L** = Lot Code

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