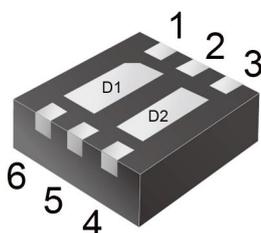


# TSM500P02DCQ

## 20V Dual P-Channel MOSFET

TDFN2x2



**Pin Definition:**

- |             |             |
|-------------|-------------|
| 1. Source 1 | 6. Drain 1  |
| 2. Gate 1   | 5. Gate 2   |
| 3. Drain 2  | 4. Source 2 |

**Key Parameter Performance**

Parameter	Value	Unit
$V_{DS}$	-20	V
$R_{DS(on)}$ (max)	$V_{GS} = -4.5V$	50
	$V_{GS} = -2.5V$	65
	$V_{GS} = -1.8V$	85
$Q_g$	9.6	nC

**Features**

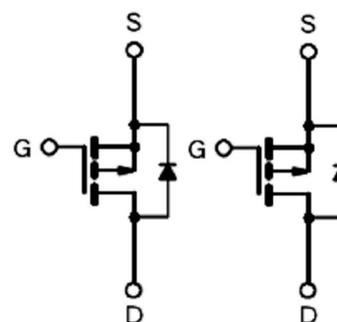
- Halogen-free
- Suited for 1.8V drive applications
- Low profile package

**Ordering Information**

Part No.	Package	Packing
TSM500P02DCQ RFG	TDFN2x2	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**



Dual P-Channel MOSFET

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-20	V
Gate-Source Voltage	$V_{GS}$	$\pm 10$	V
Continuous Drain Current	$I_D$	-4.7	A
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	-18.8	A
Maximum Power Dissipation @ $T_C = 25^\circ C$	$P_D$	1	W
Operating Junction Temperature	$T_J$	+150	$^\circ C$
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 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)

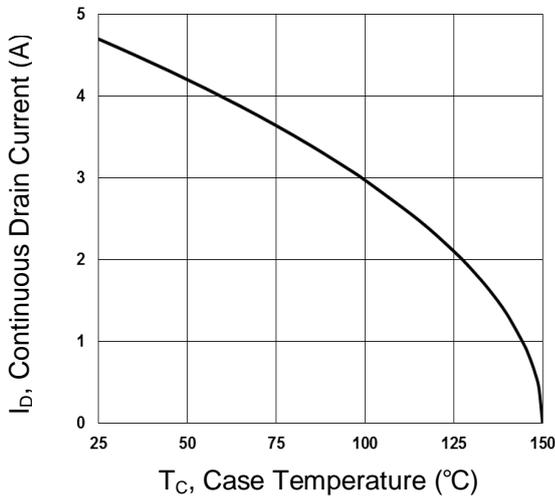
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = -250μA	BV <sub>DSS</sub>	-20	--	--	V
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = -250μA	V <sub>GS(TH)</sub>	-0.3	-0.6	-0.8	V
Gate-Source Leakage Current	V <sub>GS</sub> = ±10V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±100	nA
Drain-Source Leakage Current	V <sub>DS</sub> = -20V, V <sub>GS</sub> = 0V	I <sub>DSS</sub>	--	--	-1	μA
Drain-Source On-State Resistance	V <sub>GS</sub> = -4.5V, I <sub>D</sub> = -3A	R <sub>DS(on)</sub>	--	42	50	m
	V <sub>GS</sub> = -2.5V, I <sub>D</sub> = -2A		--	57	65	
	V <sub>GS</sub> = -1.8V, I <sub>D</sub> = -1A		--	75	85	
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> = -3A, V <sub>GS</sub> = -4.5V	Q <sub>g</sub>	--	9.6	13	nC
Gate-Source Charge <sup>(Note 2,3)</sup>		Q <sub>gs</sub>	--	1.6	2	
Gate-Drain Charge <sup>(Note 2,3)</sup>		Q <sub>gd</sub>	--	2	4	
Input Capacitance	V <sub>DS</sub> = -10V, V <sub>GS</sub> = 0V, f = 1MHz	C <sub>iss</sub>	--	850	1230	pF
Output Capacitance		C <sub>oss</sub>	--	70	100	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	55	80	
<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>G</sub> = 25	t <sub>d(on)</sub>	--	6	11	ns
Turn-On Rise Time <sup>(Note 2,3)</sup>		t <sub>r</sub>	--	21.6	41	
Turn-Off Delay Time <sup>(Note 2,3)</sup>		t <sub>d(off)</sub>	--	51	97	
Turn-Off Fall Time <sup>(Note 2,3)</sup>		t <sub>f</sub>	--	13.8	26	
<b>Drain-Source Diode Characteristics and Maximum Ratings</b>						
Continuous Source Current	V <sub>G</sub> = V <sub>D</sub> = 0V, Force Current	I <sub>S</sub>	--	--	-4.7	A
Pulsed Source Current		I <sub>SM</sub>	--	--	-18.8	A
Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = -1A, T <sub>J</sub> = 25°C	V <sub>SD</sub>	--	--	-1	V

#### Note:

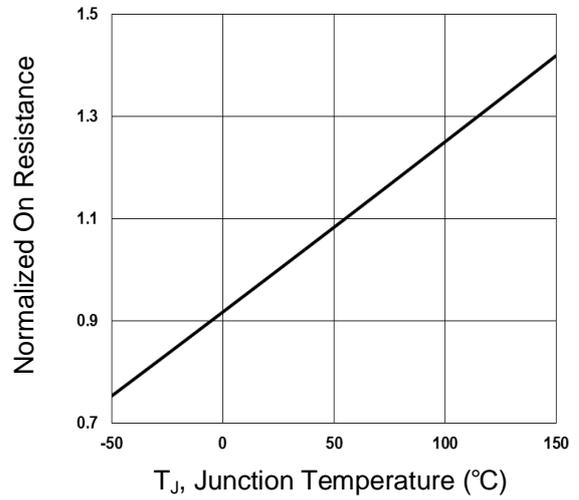
1. Repetitive Rating: Pulsed width limited by maximum junction temperature.
2. Pulse test: PW m300μs, duty cycle m2%.
3. Essentially independent of operating temperature.

### Electrical Characteristics Curves

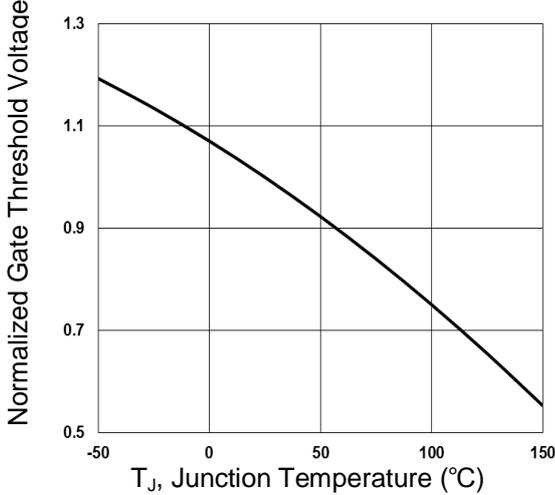
**Continuous Drain Current vs. Tc**



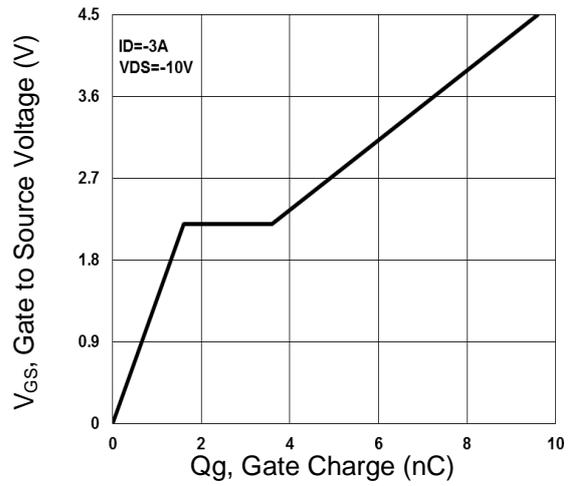
**Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



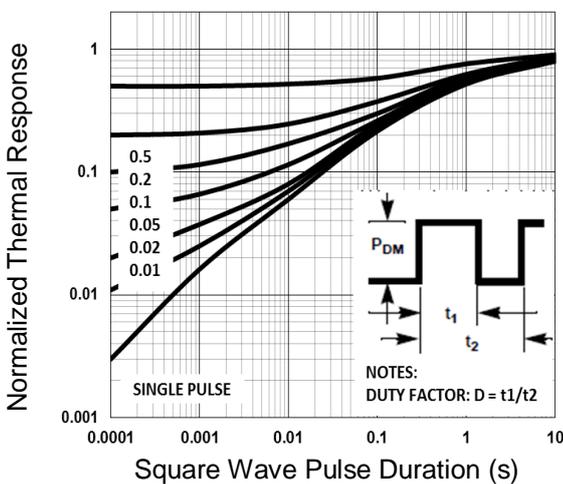
**Normalized V<sub>th</sub> vs. T<sub>J</sub>**



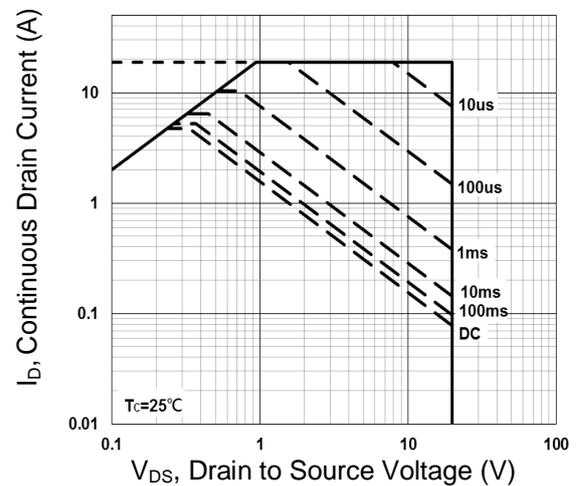
**Gate Charge Waveform**



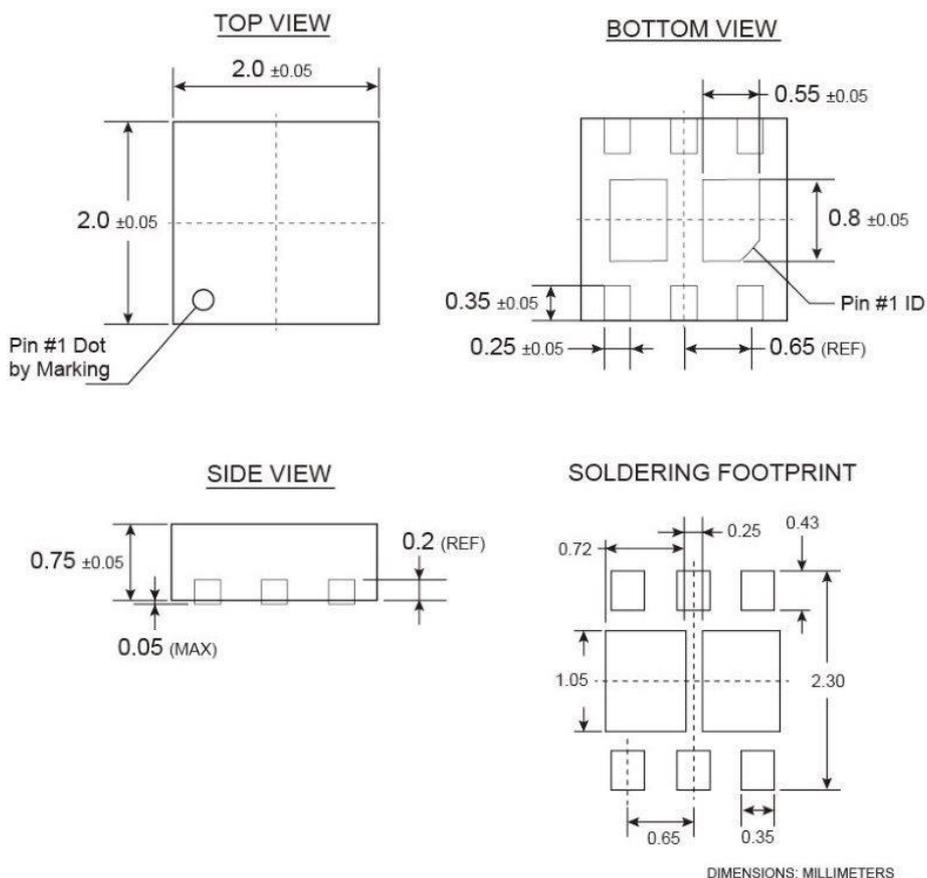
**Normalized Transient Impedance**



**Maximum Safe Operation Area**



### TDFN2x2 Mechanical Drawing



### Marking Diagram



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

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