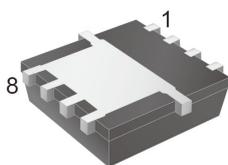


# TSM40N03PQ56

## 30V N-Channel Power MOSFET

### PDFN56



#### Pin Definition:

- |           |          |
|-----------|----------|
| 1. Source | 8. Drain |
| 2. Source | 7. Drain |
| 3. Source | 6. Drain |
| 4. Gate   | 5. Drain |

### PRODUCT SUMMARY

V <sub>DS</sub> (V)	R <sub>DS(on)</sub> (mΩ)	I <sub>D</sub> (A)
30	4.5 @ V <sub>GS</sub> =10V	19
	5.8 @ V <sub>GS</sub> =4.5V	16

### Features

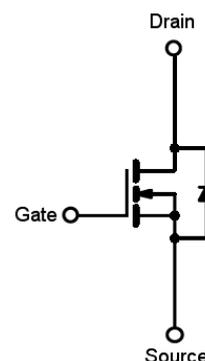
- Advanced Trench Technology
- Low On-Resistance
- Low gate charge typical @ 12nC (Typ.)
- Low Crss typical @ 140pF (Typ.)

### Ordering Information

Part No.	Package	Packing
TSM40N03PQ56 RLG	PDFN56	2.5Kpcs / 13" Reel

Note: "G" denote for Halogen Free Product

### Block Diagram



N-Channel MOSFET

### Absolute Maximum Ratings (Ta = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V <sub>DS</sub>	30	V	
Gate-Source Voltage	V <sub>GS</sub>	±20	V	
Continuous Drain Current	I <sub>D</sub>	T <sub>C</sub> =25°C	40	A
		T <sub>C</sub> =70°C	40	
		T <sub>A</sub> =25°C	31	
		T <sub>A</sub> =70°C	25	
Drain Current-Pulsed Note 1	I <sub>DM</sub>	100	A	
Avalanche Current, L=0.5mH	I <sub>AS</sub> , I <sub>AR</sub>	38	A	
Avalanche Energy, L=0.5mH	E <sub>AS</sub> , E <sub>AR</sub>	72	mJ	
Maximum Power Dissipation	P <sub>D</sub>	T <sub>C</sub> =25°C	36	W
		T <sub>C</sub> =70°C	23	
		T <sub>A</sub> =25°C	4.2	
		T <sub>A</sub> =70°C	2.7	
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C	
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +150	°C	

\* Limited by maximum junction temperature

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	Rθ <sub>JC</sub>	3.5	°C/W
Thermal Resistance - Junction to Ambient	Rθ <sub>JA</sub>	30	°C/W

Notes: Surface mounted on FR4 board t ≤ 10sec

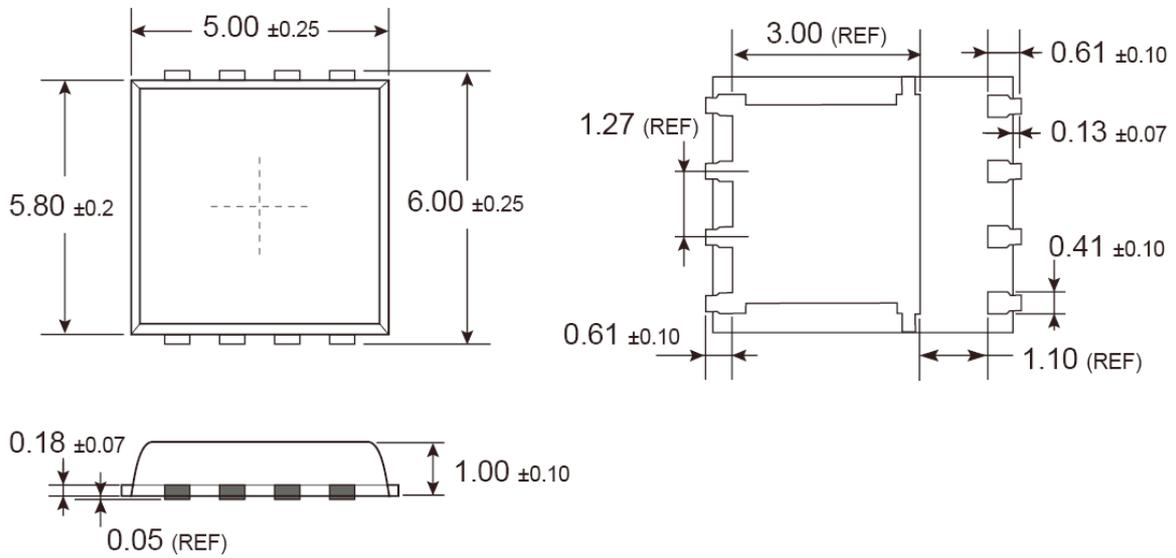
### Electrical Specifications (Ta = 25°C unless otherwise noted)

Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 19A$	$R_{DS(ON)}$	--	3.5	4.5	mΩ
	$V_{GS} = 4.5V, I_D = 16A$		--	4.6	5.8	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.15	--	2.2	V
Zero Gate Voltage Drain Current	$V_{DS} = 24V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	μA
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	±100	nA
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 15V, I_D = 19A,$ $V_{GS} = 4.5V$	$Q_g$	--	12	--	nC
Gate-Source Charge		$Q_{gs}$	--	5.4	--	
Gate-Drain Charge		$Q_{gd}$	--	4.6	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0MHz$	$C_{iss}$	--	1700	--	pF
Output Capacitance		$C_{oss}$	--	350	--	
Reverse Transfer Capacitance		$C_{rss}$	--	140	--	
<b>Switching</b>						
Turn-On Delay Time	$V_{GS} = 4.5V, V_{DS} = 15V,$ $R_G = 1\Omega$	$t_{d(on)}$	--	25	--	ns
Turn-On Rise Time		$t_r$	--	20	--	
Turn-Off Delay Time		$t_{d(off)}$	--	25	--	
Turn-Off Fall Time		$t_f$	--	15	--	
<b>Drain-Source Diode Characteristics and Maximum Rating</b>						
Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=10A$	$V_{SD}$	--	0.8	1.2	V
Reverse Recovery Time	$I_S = 10A, T_J=25^\circ C$ $dI/dt = 100A/\mu s$	$t_{fr}$	--	25	--	ns
Reverse Recovery Charge		$Q_{fr}$	--	17	--	nC

#### Notes:

1. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
2.  $R\theta_{JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistance where the case thermal reference is defined as the solder mounting surface of the drain pins.  $R\theta_{JC}$  is guaranteed by design while  $R\theta_{CA}$  is determined by the user's board design.  $R\theta_{JA}$  shown below for single device operation on FR-4 in still air
3. The maximum current rating is limited by package.

## PDFN56 Mechanical Drawing



Unit: Millimeters

### Notice

Specifications of the products displayed herein are subject to change without notice. TSC or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, to any intellectual property rights is granted by this document. Except as provided in TSC's terms and conditions of sale for such products, TSC assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of TSC products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify TSC for any damages resulting from such improper use or sale.