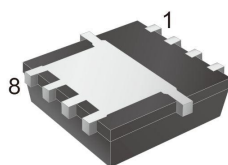


# TSM080N03PQ56

## 30V N-Channel Power MOSFET

### PDFN56



### Pin Definition:

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

### Key Parameter Performance

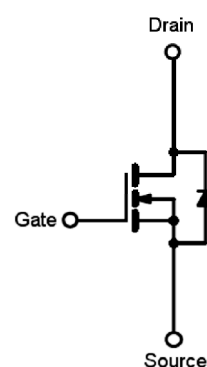
Parameter	Value	Unit
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	8
	$V_{GS} = 4.5V$	12.5
$Q_g$	7.5	nC

### Ordering Information

Part No.	Package	Packing
TSM080N03PQ56 RLG	PDFN56	2.5kpcs / 13+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<sub>c</sub> = 25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	±20	V
Continuous Drain Current	$I_D$	T <sub>c</sub> = 25°C	55
		T <sub>c</sub> = 100°C	35
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	220	A
Single Pulse Avalanche Energy <sup>(Note 2)</sup>	$E_{AS}$	45	mJ
Power Dissipation @ T <sub>c</sub> = 25°C	$P_D$	54	W
Operating Junction Temperature	T <sub>J</sub>	-55 to +150	°C
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	R <sub>JC</sub>	2.3	°C/W
Thermal Resistance - Junction to Ambient	R <sub>JA</sub>	62	

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

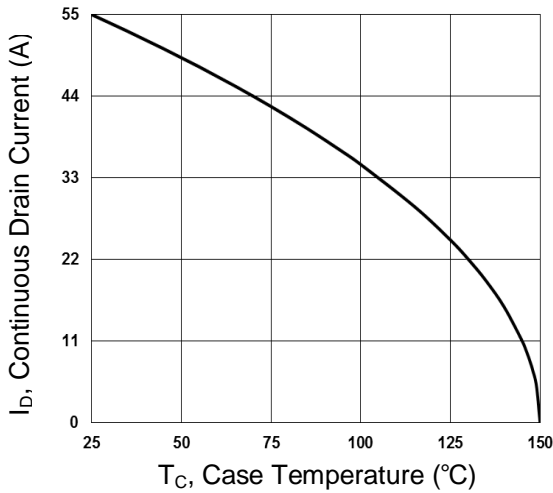
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	BV <sub>DSS</sub>	30	--	--	V
Drain-Source On-State Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 16A	R <sub>DS(on)</sub>	--	6.5	8	m
	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8A		--	9.5	12.5	
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	V <sub>GS(TH)</sub>	1	1.6	2.5	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, V <sub>GS</sub> = 0V, T <sub>J</sub> = 125°C		--	--	10	
Gate Body Leakage	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±100	nA
Forward Transconductance <sup>(Note 3)</sup>	V <sub>DS</sub> = 10V, I <sub>D</sub> = 8A	g <sub>fs</sub>	--	14	--	S
<b>Dynamic</b>						
Total Gate Charge <sup>(Note 3,4)</sup>	V <sub>DS</sub> = 15V, I <sub>D</sub> = 20A, V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	--	7.5	--	nC
Gate-Source Charge <sup>(Note 3,4)</sup>		Q <sub>gs</sub>	--	1.3	--	
Gate-Drain Charge <sup>(Note 3,4)</sup>		Q <sub>gd</sub>	--	4.5	--	
Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	750	--	pF
Output Capacitance		C <sub>oss</sub>	--	150	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	110	--	
<b>Switching</b>						
Turn-On Delay Time <sup>(Note 3,4)</sup>	V <sub>DD</sub> = 15V, I <sub>D</sub> = 15A, V <sub>GS</sub> = 10V, R <sub>GEN</sub> = 3.3	t <sub>d(on)</sub>	--	4.8	--	ns
Turn-On Rise Time <sup>(Note 3,4)</sup>		t <sub>r</sub>	--	12.5	--	
Turn-Off Delay Time <sup>(Note 3,4)</sup>		t <sub>d(off)</sub>	--	27.6	--	
Turn-Off Fall Time <sup>(Note 3,4)</sup>		t <sub>f</sub>	--	8.2	--	
<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>	--	--	55	A
Maximum Pulse Drain-Source Diode Forward Current		I <sub>SM</sub>	--	--	220	A
Diode-Source Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	V <sub>SD</sub>	--	--	1	V

#### Note:

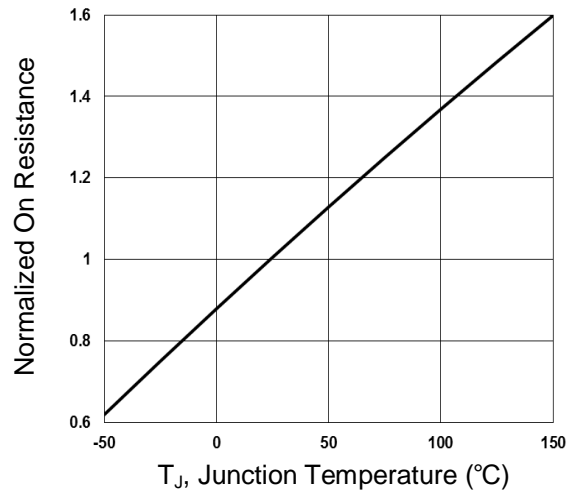
- Pulse width limited by safe operating area
- L = 0.1mH, I<sub>AS</sub> = 30A, V<sub>DD</sub> = 25V, R<sub>G</sub> = 25 Ω, Starting T<sub>J</sub> = 25°C
- Pulse test: pulse width m300μs, duty cycle m2%
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curves

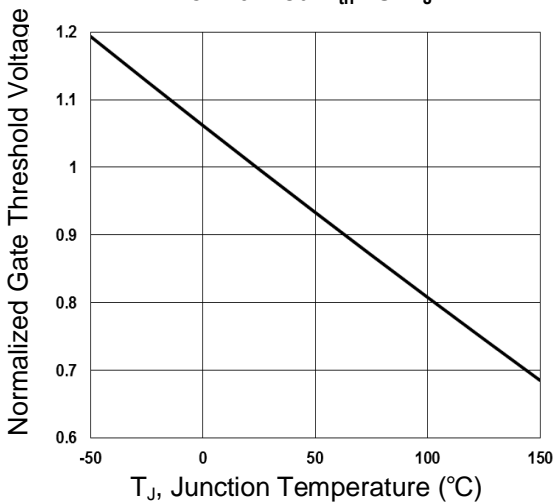
**Continuous Drain Current vs. T<sub>c</sub>**



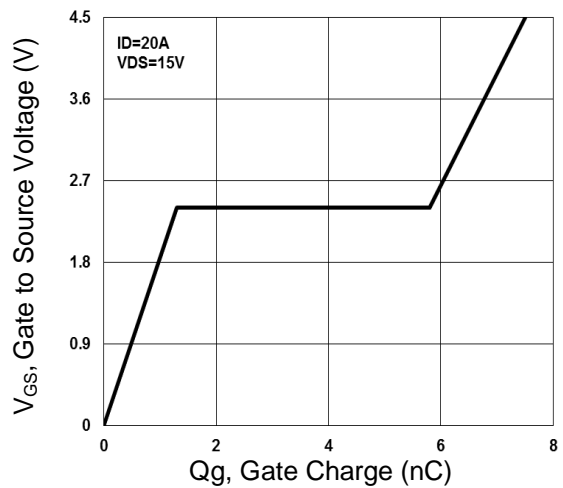
**Normalized R<sub>DS(on)</sub> vs. T<sub>J</sub>**



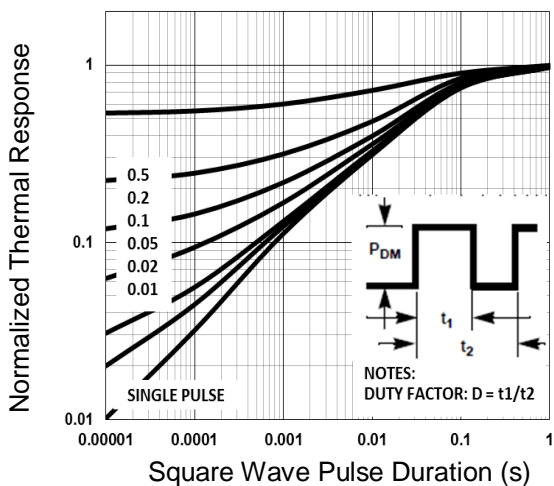
**Normalized V<sub>th</sub> vs. T<sub>J</sub>**



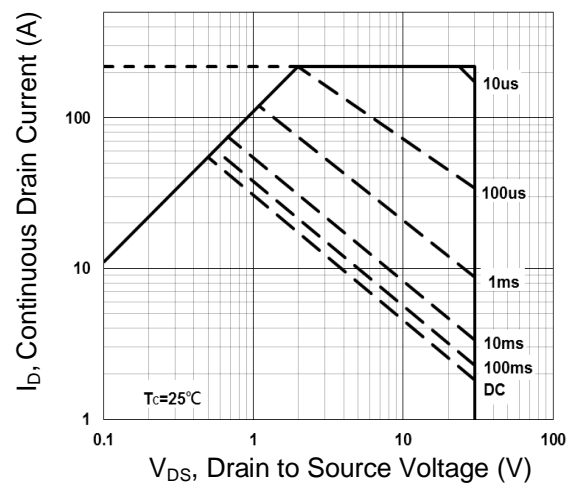
**Gate Charge Waveform**



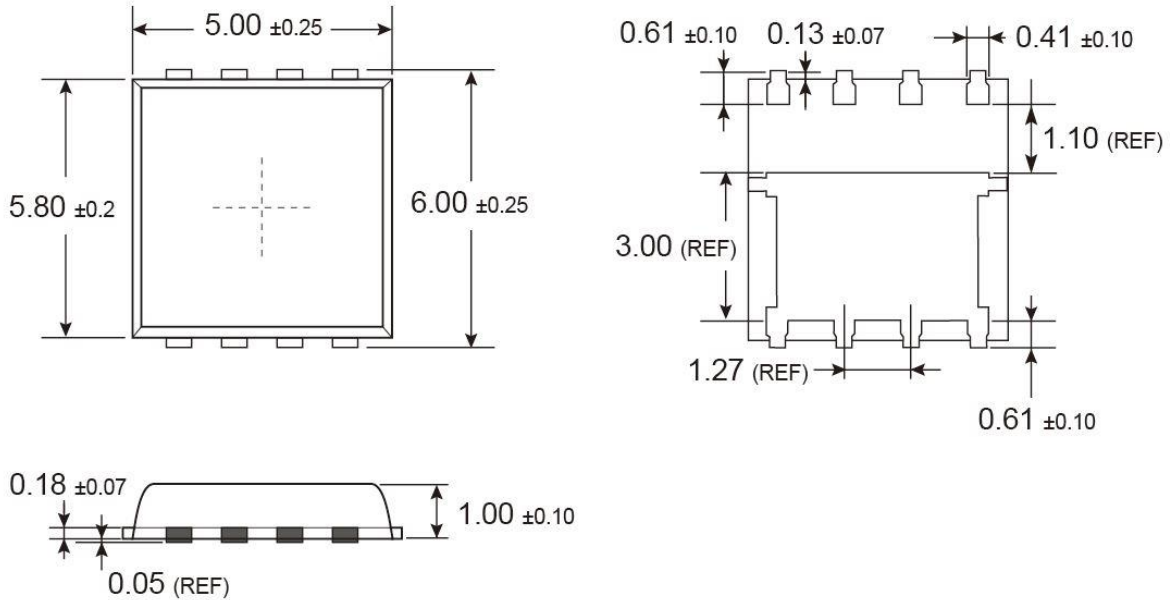
**Normalized Transient Impedance**



**Maximum Safe Operation Area**

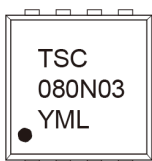


### PDFN56 Mechanical Drawing



Unit: Millimeters

### Marking Diagram



- 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

# TSM080N03PQ56

## 30V N-Channel Power MOSFET

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