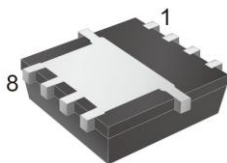


# TSM055N03EPQ56

## 30V N-Channel MOSFET

### PDFN56



### Pin Definition:

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

### Note:

MSL 1 (Moisture Sensitivity Level) per J-STD-020

### Key Parameter Performance

Parameter	Value	Unit
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	5.5
	$V_{GS} = 4.5V$	8.5
$Q_g$	11.1	nC

### Ordering Information

Part No.	Package	Packing
TSM055N03EPQ56 RLG	PDFN56	2.5kpcs / 13" Reel

- Note: Halogen-free according to IEC 61249-2-21 definition

### Block Diagram



N-Channel MOSFET with ESD protection

### 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	80
		T <sub>C</sub> = 100°C	51
Drain Current-Pulsed (Note 1)	$I_{DM}$	320	A
Single Pulse Avalanche Energy (Note 2)	$E_{AS}$	45	mJ
Maximum Power Dissipation @ T <sub>C</sub> = 25°C	$P_D$	74	W
Storage Temperature Range	T <sub>STG</sub>	-55 to +150	°C
Operating Junction Temperature Range	T <sub>J</sub>	-55 to +150	°C

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R_{\theta JC}$	1.7	°C/W
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	°C/W

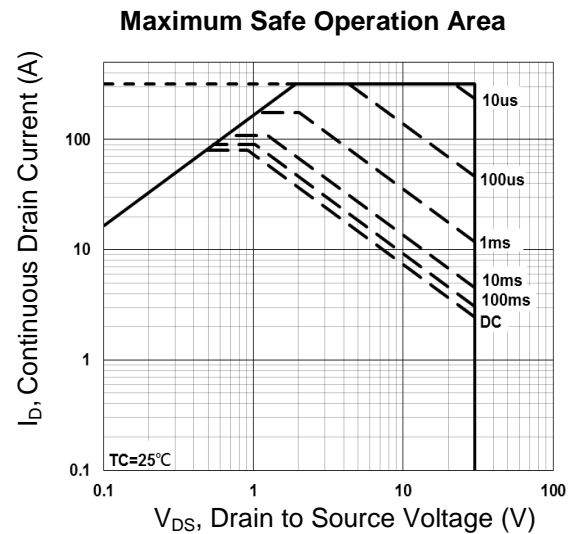
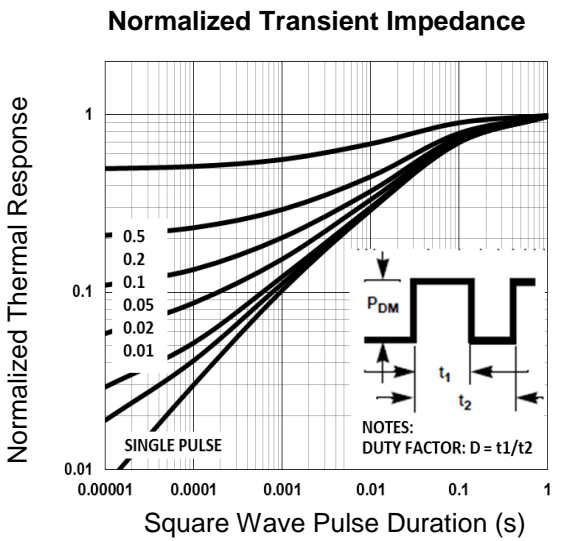
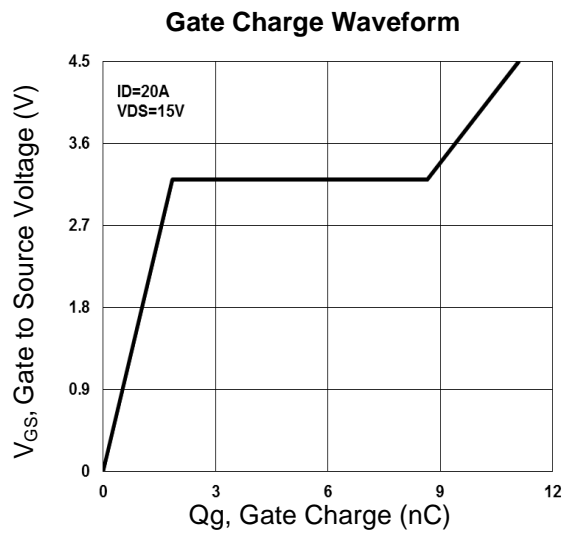
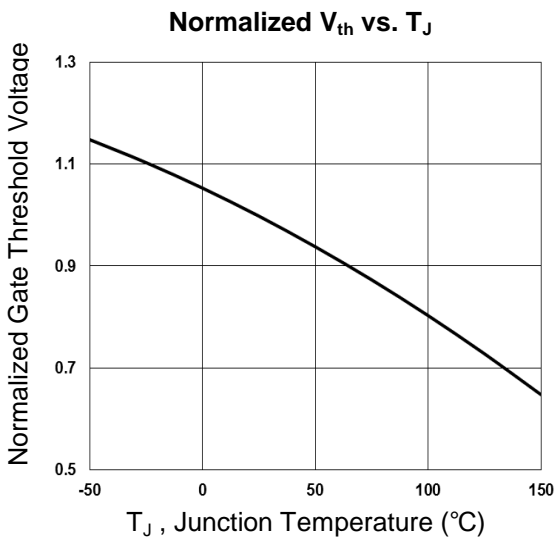
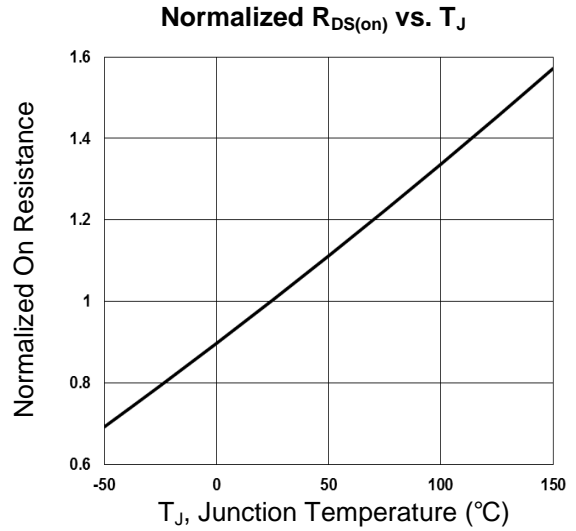
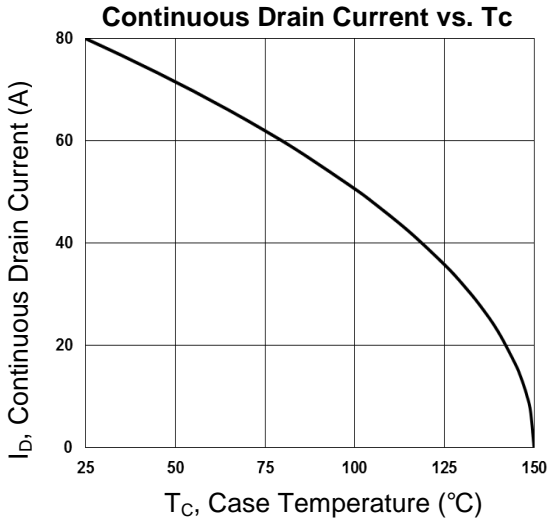
### Electrical Specifications (T<sub>C</sub> = 25°C unless otherwise noted)

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> = 10V, I <sub>D</sub> = 20A	R <sub>DS(ON)</sub>	--	4.5	5.5	mΩ
	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 10A		--	6.3	8.5	
Gate Threshold Voltage	V <sub>DS</sub> = V <sub>GS</sub> , I <sub>D</sub> = 250μA	V <sub>GS(TH)</sub>	1.2	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	μA
Gate Body Leakage	V <sub>GS</sub> = ±20V, V <sub>DS</sub> = 0V	I <sub>GSS</sub>	--	--	±10	μA
<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>	--	11.1	--	nC
Gate-Source Charge <sup>(Note 3,4)</sup>		Q <sub>gs</sub>	--	1.85	--	
Gate-Drain Charge <sup>(Note 3,4)</sup>		Q <sub>gd</sub>	--	6.8	--	
Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	1210	--	pF
Output Capacitance		C <sub>oss</sub>	--	190	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	100	--	
<b>Switching</b>						
Turn-On Delay Time <sup>(Note 3,4)</sup>	V <sub>GS</sub> = 10V, V <sub>DS</sub> = 15V, R <sub>G</sub> = 3.3Ω, I <sub>D</sub> = 15A	t <sub>d(on)</sub>	--	7.5	--	ns
Turn-On Rise Time <sup>(Note 3,4)</sup>		t <sub>r</sub>	--	14.5	--	
Turn-Off Delay Time <sup>(Note 3,4)</sup>		t <sub>d(off)</sub>	--	35.2	--	
Turn-Off Fall Time <sup>(Note 3,4)</sup>		t <sub>f</sub>	--	9.6	--	
<b>Drain-Source Diode Characteristics and Maximum Rating</b>						
Maximum Continuous Drain-Source Diode Forward Current	Integral reverse diode in the MOSFET	I <sub>S</sub>	--	--	80	A
Maximum Pulse Drain-Source Diode Forward Current		I <sub>SM</sub>	--	--	320	A
Drain-Source Diode Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	V <sub>SD</sub>	--	--	1	V

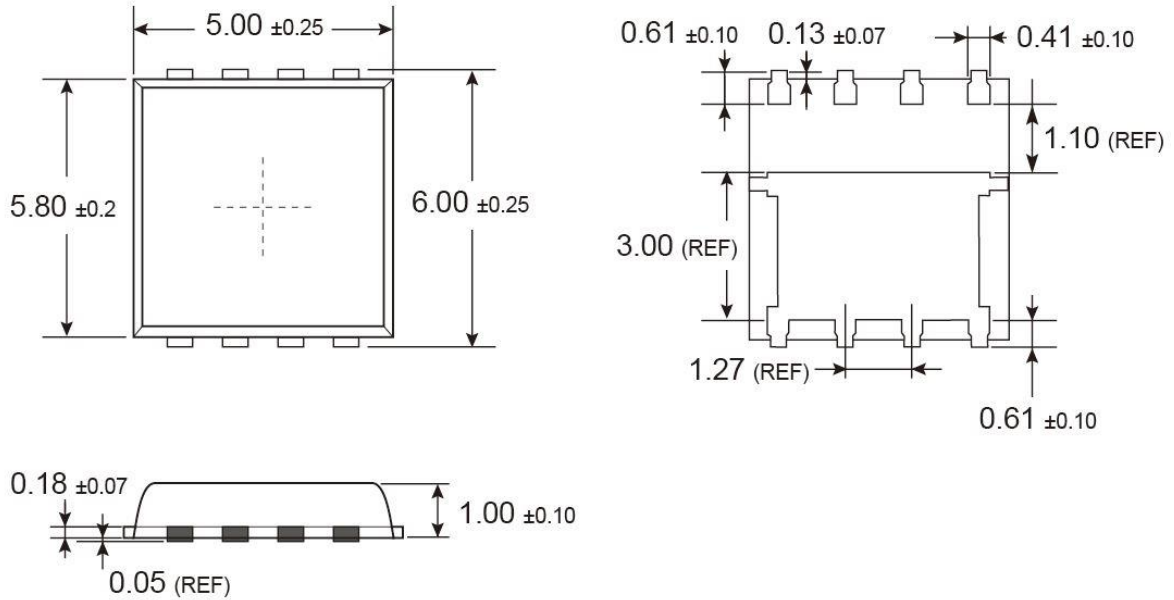
#### Notes:

1. Repetitive Rating : Pulsed width limited by maximum junction temperature.
2. V<sub>DD</sub> = 25V, V<sub>GS</sub> = 10V, L = 0.1mH, I<sub>AS</sub> = 42A, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C.
3. Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%
4. Essentially independent of operating temperature.

### Electrical Characteristics Curves



**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

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