



**THE DATASHEET OF  
TSM080N03EPQ56 RLG**



## N-Channel Power MOSFET

30V, 55A, 8mΩ

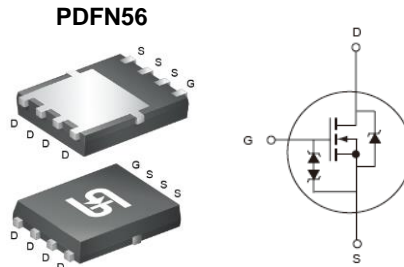
### FEATURES

- Fast switching
- 100% EAS Guaranteed
- Green Device Available
- G-S ESD Protection Diode Embedded

### APPLICATION

- Vcore / MB
- POL Application
- SMPS 2<sup>nd</sup> SR

KEY PERFORMANCE PARAMETERS		
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



**Notes:** Moisture sensitivity level: level 3. Per J-STD-020

### ABSOLUTE MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ unless otherwise noted)

PARAMETER	SYMBOL	LIMIT	UNIT
Drain-Source Voltage	$V_{DS}$	30	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current <sup>(Note 1)</sup>	$I_D$	$T_C = 25^\circ\text{C}$	55
		$T_C = 100^\circ\text{C}$	35
Pulsed Drain Current <sup>(Note 2)</sup>	$I_{DM}$	220	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_{TOT}$	54	W
Single Pulsed Avalanche Energy <sup>(Note 3)</sup>	$E_{AS}$	45	mJ
Single Pulsed Avalanche Current <sup>(Note 3)</sup>	$I_{AS}$	30	A
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	- 55 to +150	$^\circ\text{C}$

### THERMAL PERFORMANCE

PARAMETER	SYMBOL	LIMIT	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	2.3	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	62	$^\circ\text{C/W}$

**Notes:**  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins.  $R_{\theta JA}$  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 PCB in still air.

<b>ELECTRICAL SPECIFICATIONS</b> ( $T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
<b>Static</b> (Note 4)						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	30	--	--	V
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.6	2.5	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 10$	$\mu A$
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 16A$	$R_{DS(on)}$	--	6.5	8	m $\Omega$
	$V_{GS} = 4.5V, I_D = 8A$		--	9.5	12.5	m $\Omega$
<b>Dynamic</b> (Note 5)						
Total Gate Charge	$V_{DS} = 15V, I_D = 20A,$ $V_{GS} = 4.5V$	$Q_g$	--	7.5	--	nC
Gate-Source Charge		$Q_{gs}$	--	1.3	--	
Gate-Drain Charge		$Q_{gd}$	--	4.5	--	
Input Capacitance	$V_{DS} = 25V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	$C_{iss}$	--	750	--	pF
Output Capacitance		$C_{oss}$	--	150	--	
Reverse Transfer Capacitance		$C_{rss}$	--	110	--	
Gate Resistance	$F = 1\text{MHz}, \text{open drain}$	$R_g$	--	2.7	--	$\Omega$
<b>Switching</b> (Note 6)						
Turn-On Delay Time	$V_{DD} = 15V,$ $R_{GEN} = 3.3\Omega,$ $I_D = 15A, V_{GS} = 10V,$	$t_{d(on)}$	--	4.8	--	ns
Turn-On Rise Time		$t_r$	--	12.5	--	
Turn-Off Delay Time		$t_{d(off)}$	--	27.6	--	
Turn-Off Fall Time		$t_f$	--	8.2	--	
<b>Source-Drain Diode</b> (Note 4)						
Forward On Voltage	$I_S = 1A, V_{GS} = 0V$	$V_{SD}$	--	--	1	V

**Notes:**

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3.  $L = 0.1\text{mH}, I_{AS} = 30A, V_{DD} = 25V, R_G = 25\Omega,$  Starting  $T_J = 25^\circ\text{C}$
4. Pulse test:  $PW \leq 300\mu s,$  duty cycle  $\leq 2\%$
5. For DESIGN AID ONLY, not subject to production testing.
6. Switching time is essentially independent of operating temperature.

**ORDERING INFORMATION**

<b>PART NO.</b>	<b>PACKAGE</b>	<b>PACKING</b>
TSM080N03EPQ56 RLG	PDFN56	2,500pcs / 13" Reel

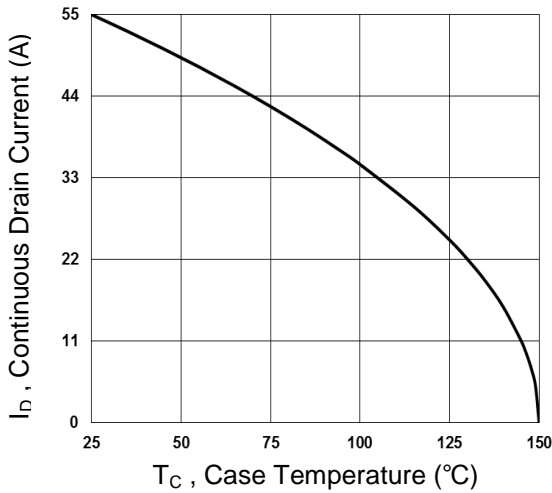
**Note:**

1. Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
2. Halogen-free according to IEC 61249-2-21 definition

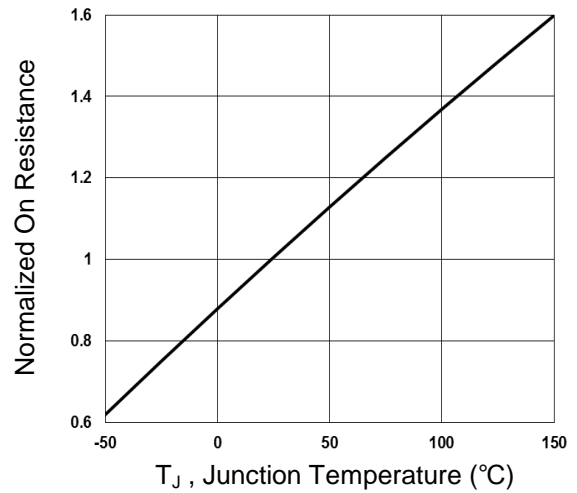
**CHARACTERISTICS CURVES**

( $T_C = 25^\circ\text{C}$  unless otherwise noted)

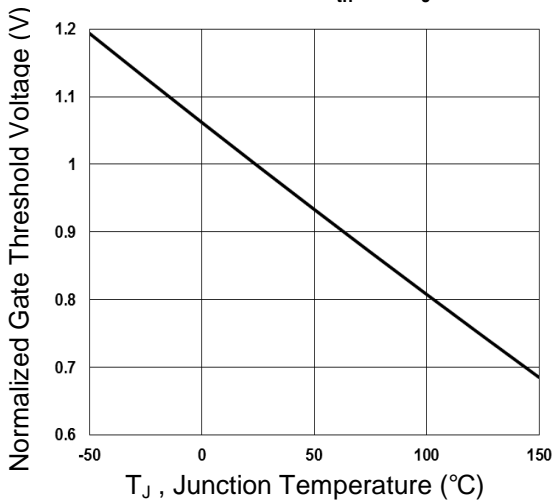
**Continuous Drain Current vs.  $T_C$**



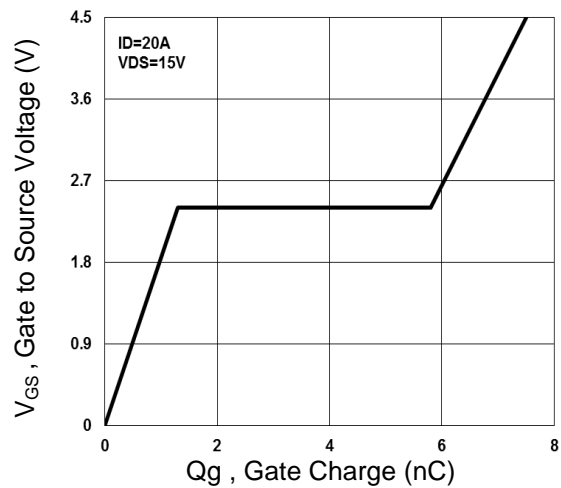
**Normalized  $R_{DS(on)}$  vs.  $T_J$**



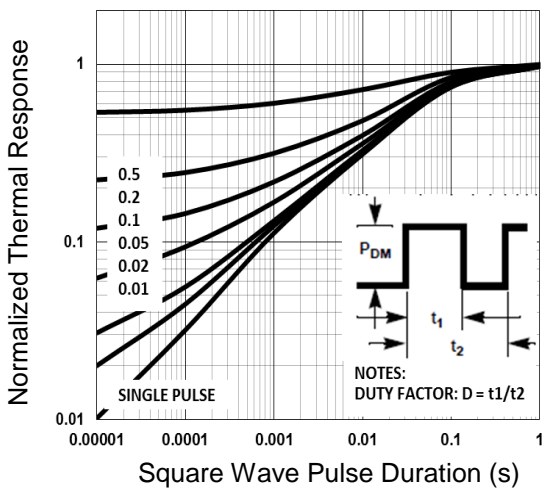
**Normalized  $V_{th}$  vs.  $T_J$**



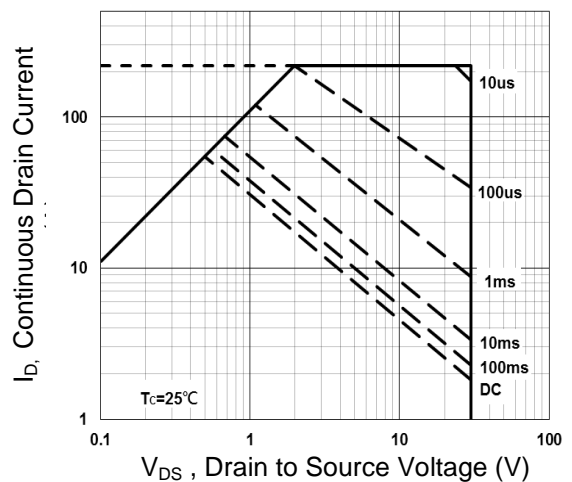
**Gate Charge Waveform**



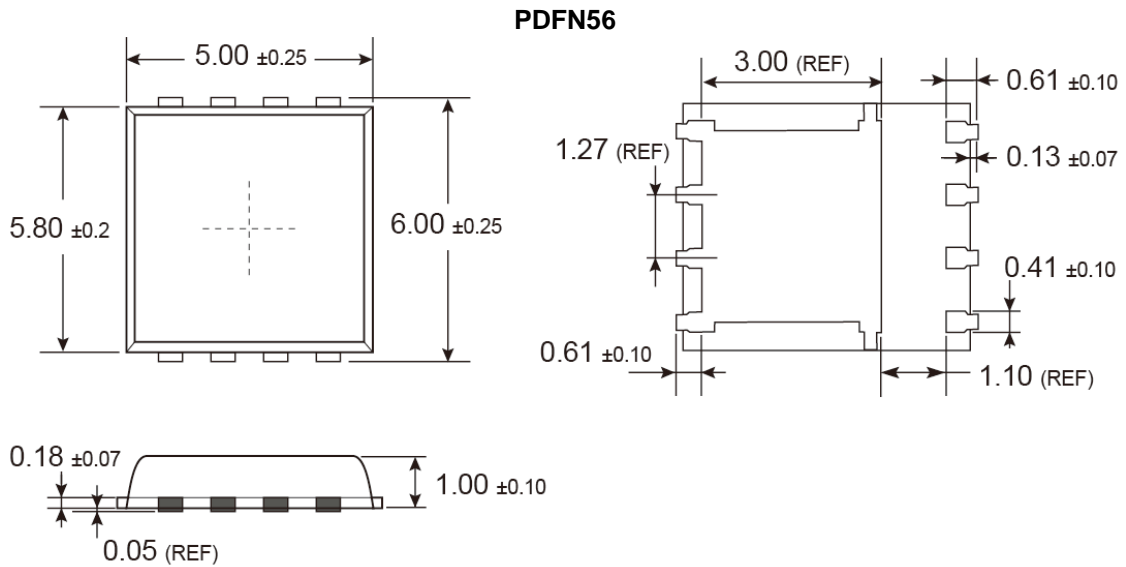
**Normalized Transient Impedance**



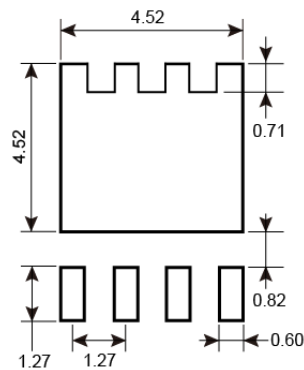
**Maximum Safe Operation Area**



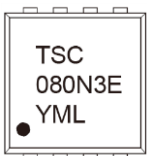
**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)



**SUGGESTED PAD LAYOUT** (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 (1~9, A~Z)

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