



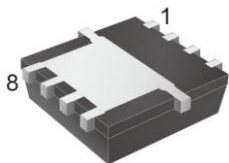
**THE DATASHEET OF  
TSM180N03PQ33 RGG**



# TSM180N03PQ33

## 30V N-Channel Power MOSFET

### PDFN33



### 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

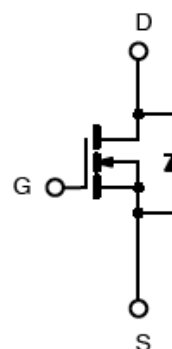
Parameter	Value	Unit
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	18
	$V_{GS} = 4.5V$	28
$Q_g$	4.1	nC

### Ordering Information

Part No.	Package	Packing
TSM180N03PQ33 RGG	PDFN33	5Kpcs / 13" Reel

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

### Block Diagram



N-Channel MOSFET

### Absolute Maximum Ratings ( $T_C = 25^\circ C$ 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	$I_D$	$T_C = 25^\circ C$	25
		$T_C = 100^\circ C$	16
Pulsed Drain Current <sup>(Note 1)</sup>	$I_{DM}$	100	A
Single Pulse Avalanche Energy <sup>(Note 2)</sup>	$E_{AS}$	32	mJ
Power Dissipation @ $T_C = 25^\circ C$	$P_D$	21	W
Operating Junction Temperature	$T_J$	+150	$^\circ C$
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Ambient	$R_{\theta JA}$	62	$^\circ C/W$
Thermal Resistance - Junction to Case	$R_{\theta JC}$	6	$^\circ C/W$

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

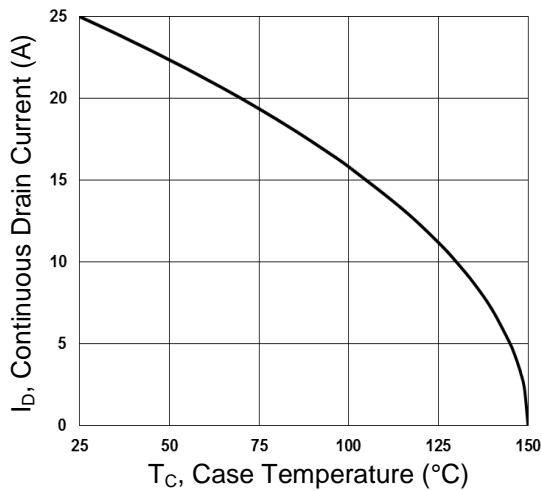
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	V <sub>GS</sub> = 0V, I <sub>D</sub> = 250μA	BV <sub>DSS</sub>	30	--	--	V
Drain-Source On-State Resistance	V <sub>GS</sub> = 10V, I <sub>D</sub> = 12A	R <sub>DS(ON)</sub>	--	14	18	mΩ
	V <sub>GS</sub> = 4.5V, I <sub>D</sub> = 8A		--	20	28	
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, 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 (Note 3)	V <sub>DS</sub> = 10V, I <sub>D</sub> = 6A	g <sub>fs</sub>	--	6.5	--	S
<b>Dynamic</b>						
Total Gate Charge (Note 3,4)	V <sub>DS</sub> = 15V, I <sub>D</sub> = 6A, V <sub>GS</sub> = 4.5V	Q <sub>g</sub>	--	4.1	--	nC
Gate-Source Charge (Note 3,4)		Q <sub>gs</sub>	--	1	--	
Gate-Drain Charge (Note 3,4)		Q <sub>gd</sub>	--	2.1	--	
Input Capacitance	V <sub>DS</sub> = 25V, V <sub>GS</sub> = 0V, f = 1.0MHz	C <sub>iss</sub>	--	345	--	pF
Output Capacitance		C <sub>oss</sub>	--	55	--	
Reverse Transfer Capacitance		C <sub>rss</sub>	--	32	--	
<b>Switching</b>						
Turn-On Delay Time (Note 3,4)	V <sub>DD</sub> = 15V, I <sub>D</sub> = 1A, V <sub>GS</sub> = 10V, R <sub>G</sub> = 6Ω	t <sub>d(on)</sub>	--	2.8	--	ns
Turn-On Rise Time (Note 3,4)		t <sub>r</sub>	--	7.2	--	
Turn-Off Delay Time (Note 3,4)		t <sub>d(off)</sub>	--	15.8	--	
Turn-Off Fall Time (Note 3,4)		t <sub>f</sub>	--	4.6	--	
<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>	--	--	25	A
Maximum Pulse Drain-Source Diode Forward Current		I <sub>SM</sub>	--	--	100	A
Diode-Source Forward Voltage	V <sub>GS</sub> = 0V, I <sub>S</sub> = 1A	V <sub>SD</sub>	--	--	1	V

#### Note:

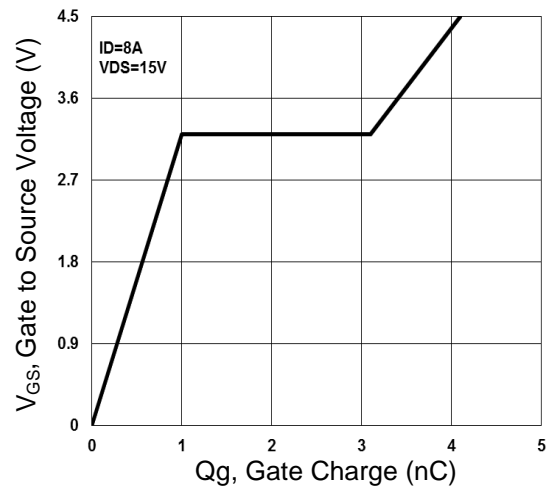
- Pulse width limited by safe operating area
- L = 1mH, I<sub>AS</sub> = 8A, V<sub>DD</sub> = 25V, R<sub>G</sub> = 25Ω, Starting T<sub>J</sub> = 25°C
- Pulse test: pulse width ≤ 300μs, duty cycle ≤ 2%
- Switching time is essentially independent of operating temperature.

### Electrical Characteristics Curve

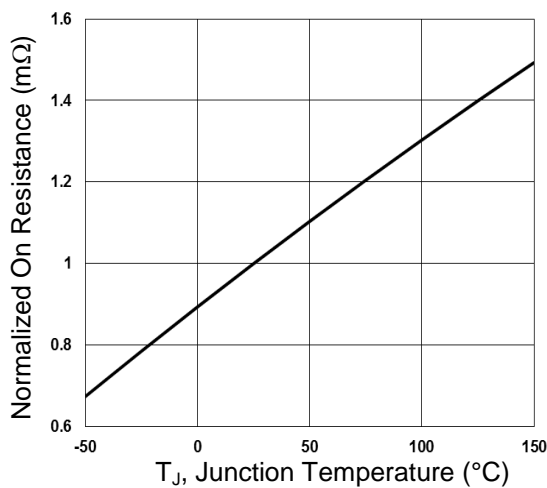
**Continuous Drain Current vs.  $T_C$**



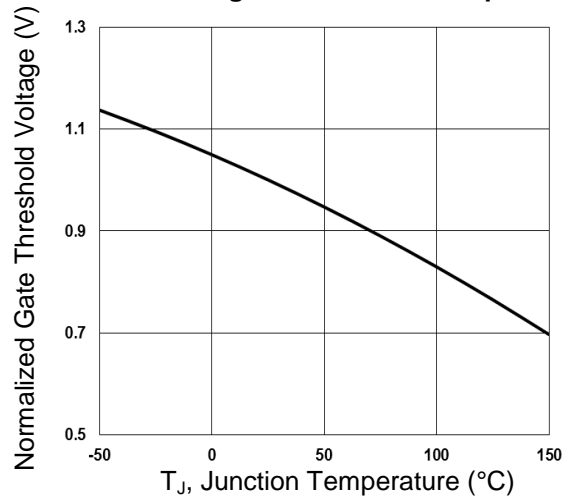
**Gate Charge**



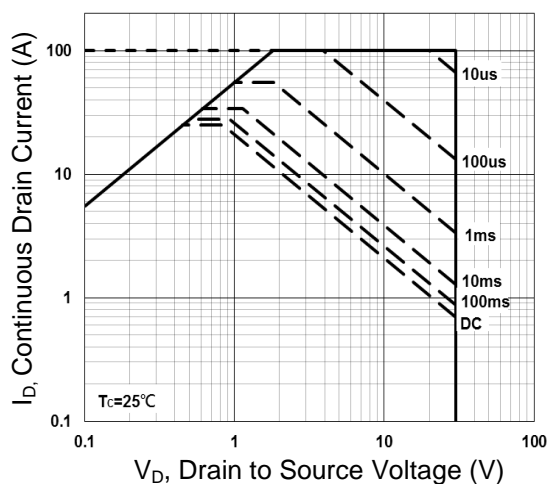
**On-Resistance vs. Junction Temperature**



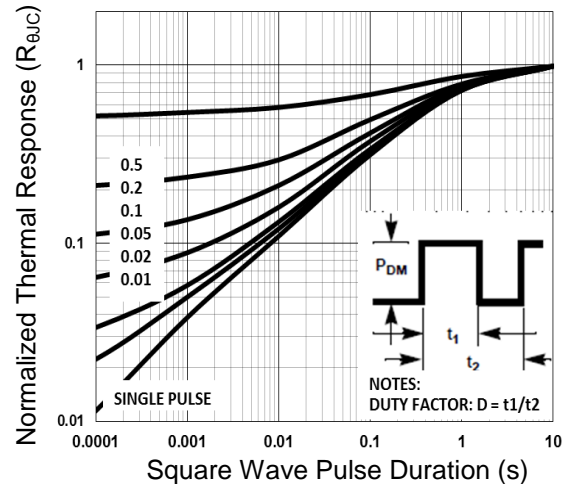
**Threshold Voltage vs. Junction Temperature**



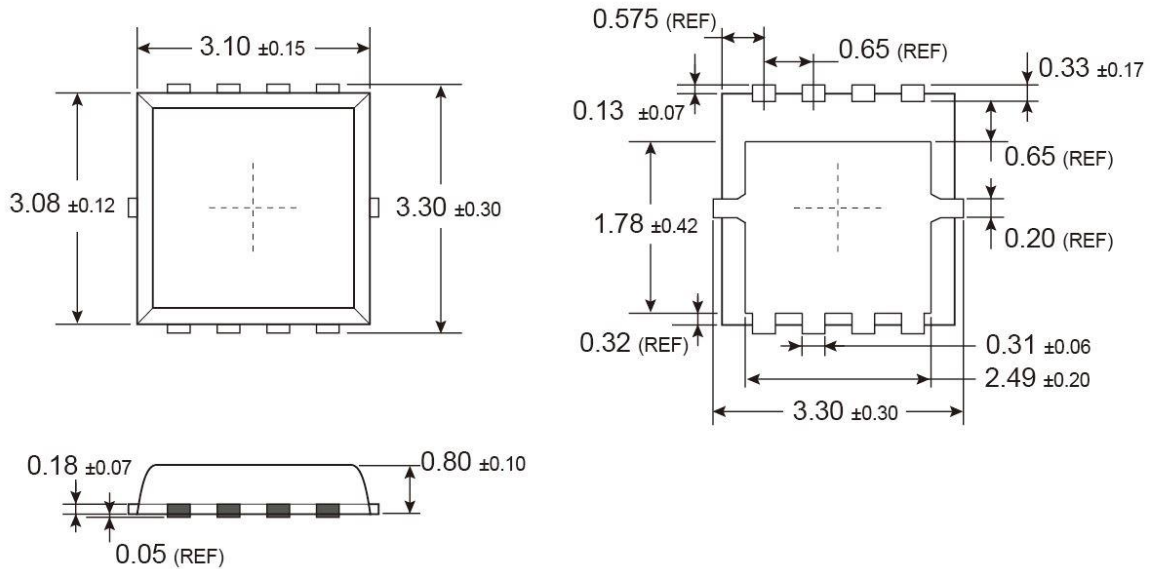
**Maximum Safe Operating Area**



**Normalized Thermal Transient Impedance Curve**

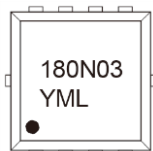


### PDFN33 Mechanical Drawing



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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