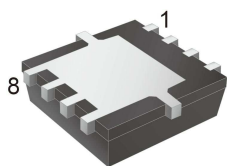


# TSM15N03PQ33

## 30V N-Channel Power MOSFET

PDFN33



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)	$V_{GS} = 10V$	12
	$V_{GS} = 4.5V$	17
$Q_g$	3.6	nC

### Features

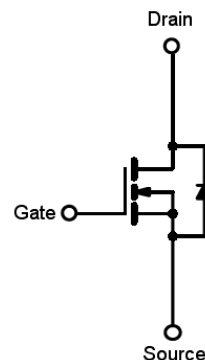
- Advanced Trench Technology
- Low On-Resistance

### Ordering Information

Part No.	Package	Packing
TSM15N03PQ33 RGG	PDFN33	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 ( $T_A=25^\circ C$ 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 <sup>(Note 3)</sup>	$I_D$	$T_C=25^\circ C$	14
		$T_C=70^\circ C$	14
		$T_A=25^\circ C$	9.7
		$T_A=70^\circ C$	7.8
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	35	A
Avalanche Current, L=0.1mH	$I_{AS}$	9	A
Avalanche Energy, L=0.1mH	$E_{AS}$	4	mJ
Maximum Power Dissipation	$P_D$	$T_C=25^\circ C$	15.6
		$T_C=70^\circ C$	10
		$T_A=25^\circ C$	3.2
		$T_A=70^\circ C$	2.1
Storage Temperature Range	$T_{STG}$	-55 to +150	$^\circ C$
Operating Junction Temperature Range	$T_J$	-55 to +150	$^\circ C$

### Thermal Performance

Parameter	Symbol	Limit	Unit
Thermal Resistance - Junction to Case	$R\theta_{JC}$	8	$^\circ C/W$
Thermal Resistance - Junction to Ambient	$R\theta_{JA}$	39	$^\circ C/W$

Notes: Surface mounted on FR4 board  $t \leq 10sec$

### Electrical Specifications ( $T_J=25^\circ\text{C}$ unless otherwise noted)

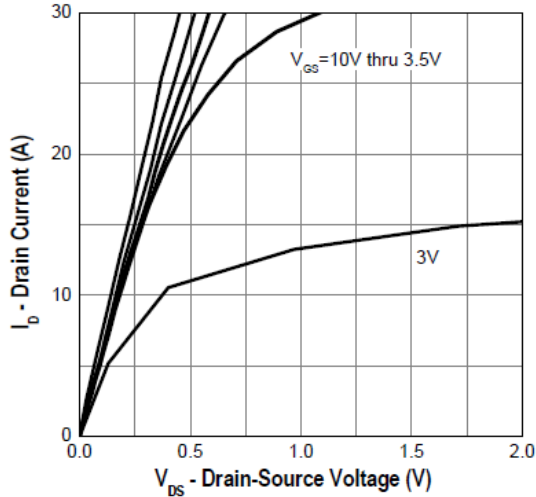
Parameter	Conditions	Symbol	Min	Typ	Max	Unit
<b>Static</b>						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	$BV_{DSS}$	30	--	--	V
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 7A$	$R_{DS(ON)}$	--	9	12	m $\Omega$
	$V_{GS} = 4.5V, I_D = 6A$		--	13	17	
Gate Threshold Voltage	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.2	--	2.5	V
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
<b>Dynamic</b>						
Total Gate Charge	$V_{DS} = 15V, I_D = 7.8A,$ $V_{GS} = 4.5V$	$Q_g$	--	3.6	--	nC
Gate-Source Charge		$Q_{gs}$	--	1.2	--	
Gate-Drain Charge		$Q_{gd}$	--	1	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	$C_{iss}$	--	415	--	pF
Output Capacitance		$C_{oss}$	--	90	--	
Reverse Transfer Capacitance		$C_{rss}$	--	38	--	
<b>Switching</b>						
Turn-On Delay Time	$V_{GS} = 4.5V, V_{DS} = 15V,$ $I_D = 6.3A, R_G = 1\Omega$	$t_{d(on)}$	--	13	--	ns
Turn-On Rise Time		$t_r$	--	10	--	
Turn-Off Delay Time		$t_{d(off)}$	--	11	--	
Turn-Off Fall Time		$t_f$	--	8	--	
<b>Drain-Source Diode Characteristics and Maximum Rating</b>						
Drain-Source Diode Forward Voltage	$V_{GS}=0V, I_S=7.8A$	$V_{SD}$	--	0.8	1.3	V
Reverse Recovery Time	$I_S = 7.8A, T_J=25^\circ\text{C}$	$t_{fr}$	--	15	--	ns
Reverse Recovery Charge	$di/dt = 100A/\mu s$	$Q_{fr}$	--	7	--	nC

#### Notes:

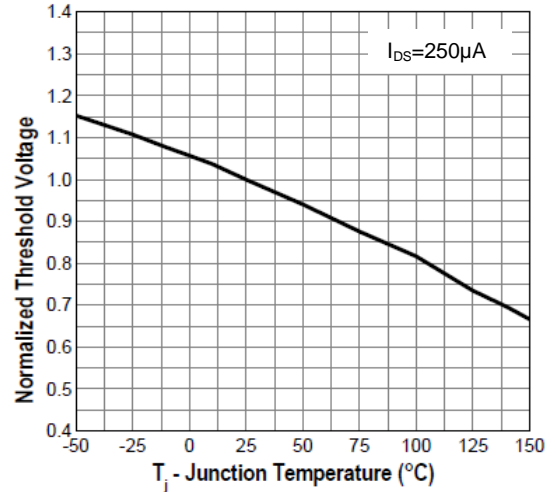
1. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .
2.  $R_{\theta JA}$  is the sum of the junction-to-case and case-to-ambient thermal resistances. The case thermal reference is defined at the solder mounting surface of the drain pins.  $R_{\theta JA}$  is guaranteed by design while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

### Electrical Characteristics Curves

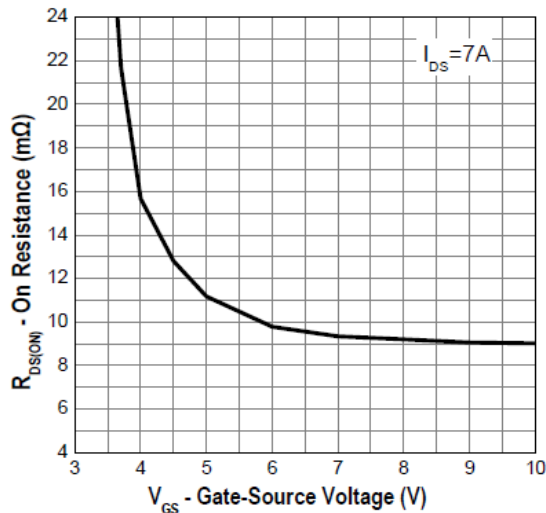
**Output Characteristics**



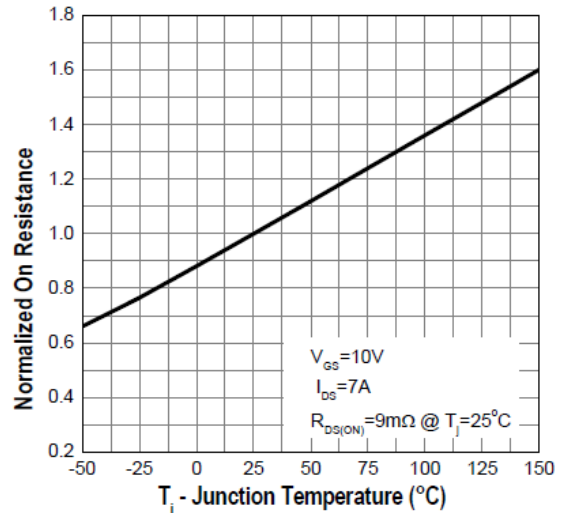
**Gate Threshold Voltage**



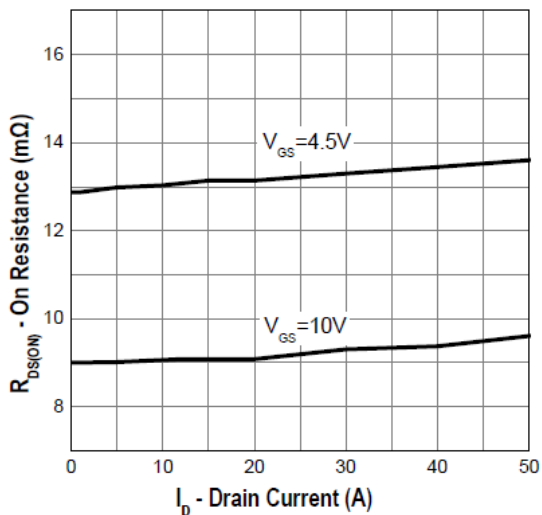
**Gate Source On Resistance**



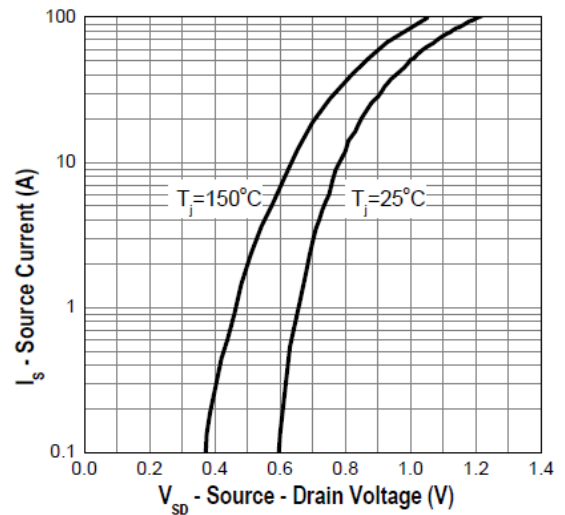
**Drain-Source On Resistance**



**Drain-Source On-Resistance**

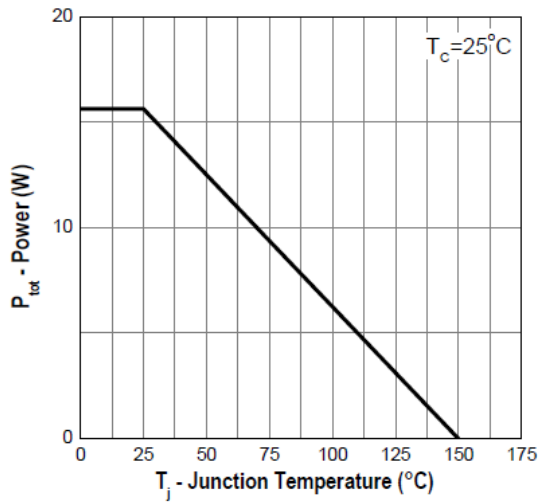


**Source-Drain Diode Forward Voltage**

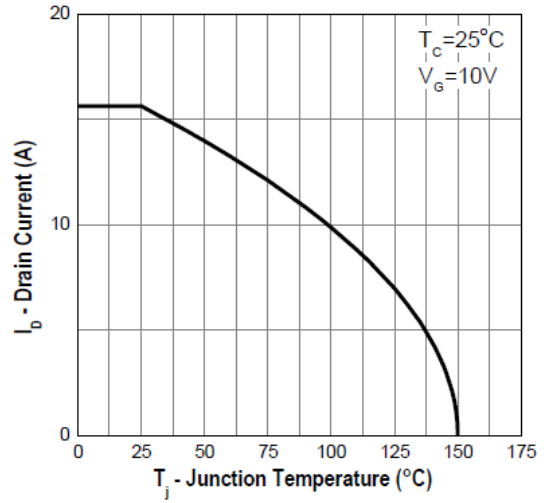


### Electrical Characteristics Curves

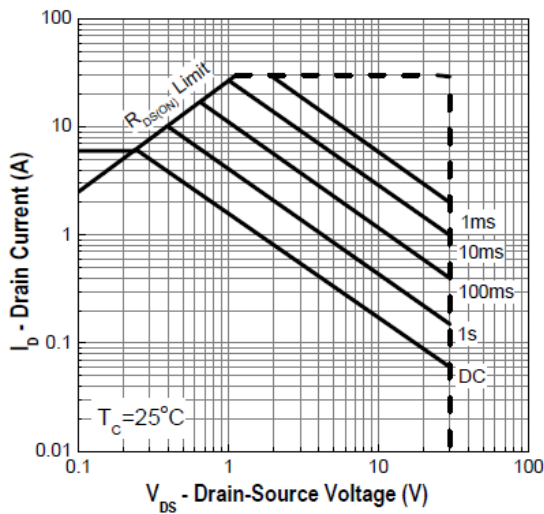
**Power Derating**



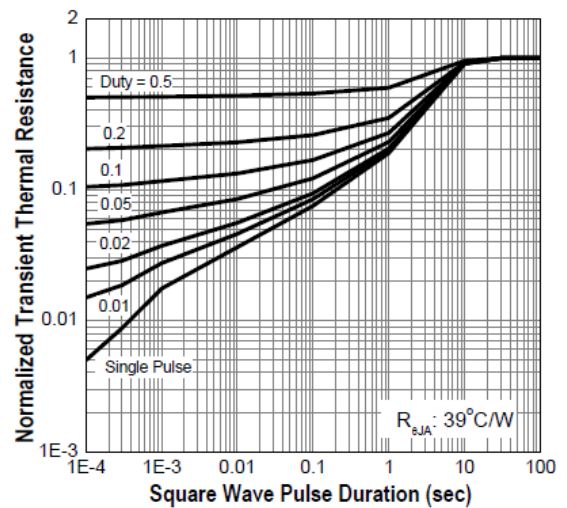
**Drain Current vs. Junction Temperature**



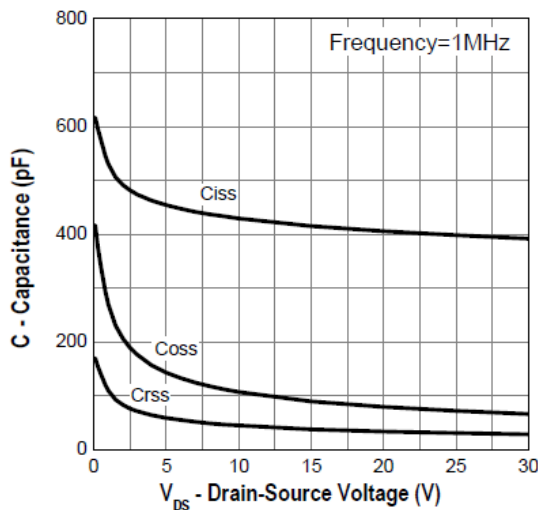
**Safe Operation Area**



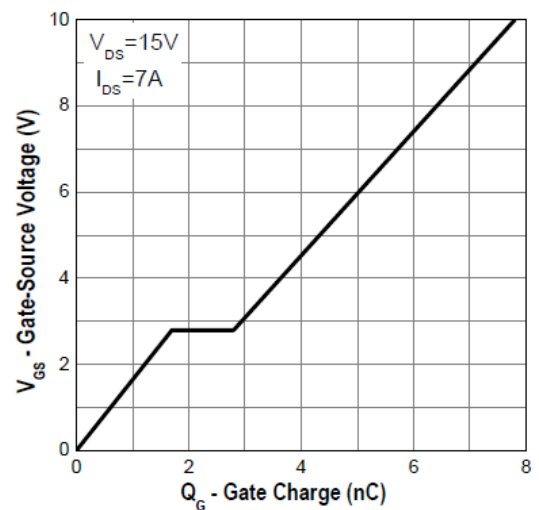
**Transient Thermal Impedance**



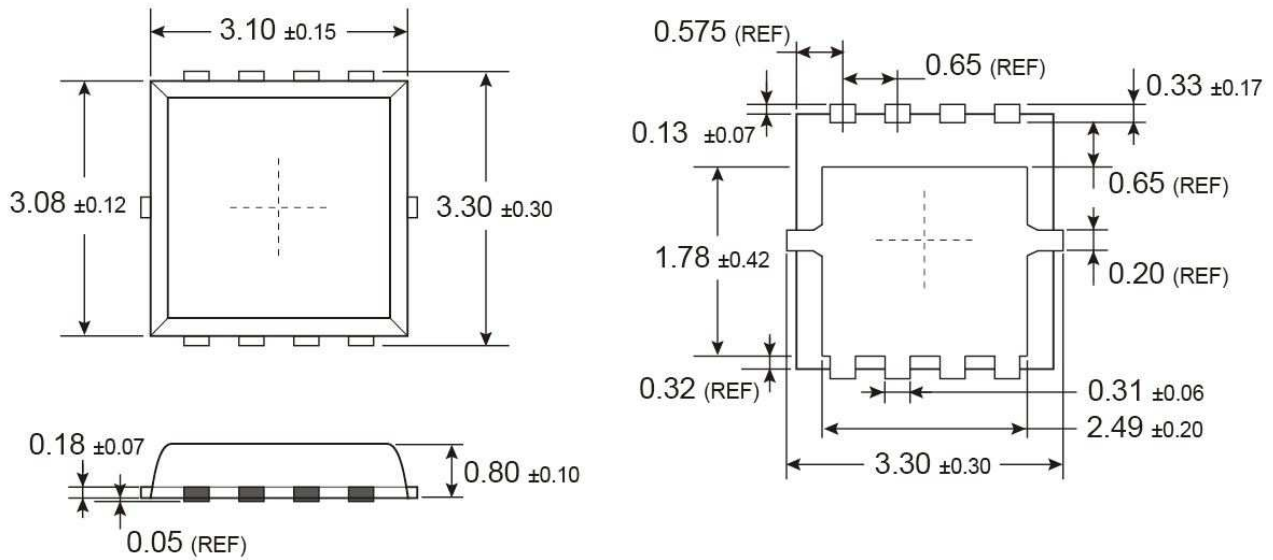
**Capacitance**



**Gate Charge**

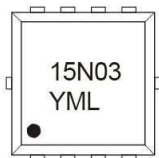


### PDFN33 Mechanical Drawing



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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