



**THE DATASHEET OF
TSM060N03PQ33 RGG**



N-Channel Power MOSFET

30V, 62A, 6mΩ

FEATURES

- Low $R_{DS(on)}$ to minimize conductive Loss
- Low gate charge for fast power switching
- 100% UIS and R_g tested
- Compliant to RoHS Directive 2011/65/EU and in accordance to WEEE 2002/96/EC
- Halogen-free according to IEC 61249-2-21 definition

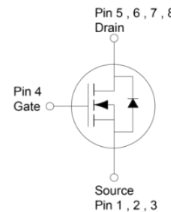
PRODUCT SUMMARY			
PARAMETER		VALUE	UNIT
V_{DS}		30	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	6	mΩ
	$V_{GS} = 4.5V$	9	
Q_g		12.9	nC

APPLICATIONS

- DC-DC Converters
- Battery Power Management
- Oring FET/Load Switch



PDFN33



Notes: MSL 1 (Moisture Sensitivity Level) 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}	± 20	V
Continuous Drain Current (Note 1)	I_D	$T_C = 25^\circ\text{C}$	62
		$T_A = 25^\circ\text{C}$	15
Pulsed Drain Current (Note 1)	I_{DM}	248	A
Single Pulse Avalanche Current (Note 2)	I_{AS}	29	A
Single Pulse Avalanche Energy (Note 2)	E_{AS}	42	mJ
Total Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	40
		$T_C = 125^\circ\text{C}$	8
Total Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	2.3
		$T_A = 125^\circ\text{C}$	0.5
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL RESISTANCE			
PARAMETER	SYMBOL	LIMIT	UNIT
Thermal Resistance – Junction to Case	$R_{\theta JC}$	3.1	$^\circ\text{C/W}$
Thermal Resistance – Junction to Ambient	$R_{\theta JA}$	53	$^\circ\text{C/W}$

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.

ELECTRICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$ unless otherwise noted)						
PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0\text{V}, I_D = 250\mu\text{A}$	BV_{DSS}	30	--	--	V
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu\text{A}$	$V_{GS(TH)}$	1.2	1.6	2.5	V
Gate-Source Leakage Current	$V_{GS} = \pm 20\text{V}, V_{DS} = 0\text{V}$	I_{GSS}	--	--	± 100	nA
Drain-Source Leakage Current	$V_{GS} = 0\text{V}, V_{DS} = 30\text{V}$	I_{DSS}	--	--	1	μA
Drain-Source On-State Resistance (Note 3)	$V_{GS} = 10\text{V}, I_D = 15\text{A}$	$R_{DS(on)}$	--	4.8	6	m Ω
	$V_{GS} = 4.5\text{V}, I_D = 15\text{A}$		--	6.7	9	
Forward Transconductance (Note 3)	$V_{DS} = 5\text{V}, I_D = 15\text{A}$	g_{fs}	--	38	--	S
Dynamic (Note 4)						
Total Gate Charge	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 15\text{A}$	Q_g	--	25.4	--	nC
Total Gate Charge	$V_{GS} = 4.5\text{V}, V_{DS} = 15\text{V}, I_D = 15\text{A}$	Q_g	--	12.9	--	
Gate-Source Charge		Q_{gs}	--	3.8	--	
Gate-Drain Charge		Q_{gd}	--	5.7	--	
Input Capacitance	$V_{GS} = 0\text{V}, V_{DS} = 15\text{V}, f = 1.0\text{MHz}$	C_{iss}	--	1342	--	pF
Output Capacitance		C_{oss}	--	227	--	
Reverse Transfer Capacitance		C_{rss}	--	169	--	
Gate Resistance	$f = 1.0\text{MHz}, \text{open drain}$	R_g	0.8	2.7	5.4	Ω
Switching (Note 4)						
Turn-On Delay Time	$V_{GS} = 10\text{V}, V_{DS} = 15\text{V}, I_D = 15\text{A}, R_G = 3.3\Omega,$	$t_{d(on)}$	--	7.5	--	ns
Rise Time		t_r	--	14.5	--	
Turn-Off Delay Time		$t_{d(off)}$	--	35.2	--	
Fall Time		t_f	--	9.6	--	
Source-Drain Diode						
Diode Forward Voltage (Note 3)	$V_{GS} = 0\text{V}, I_S = 15\text{A}$	V_{SD}	--	--	1	V
Reverse Recovery Time	$I_S = 15\text{A}, di/dt = 100\text{A}/\mu\text{s}$	t_{rr}	--	8.8	--	ns
Reverse Recovery Charge		Q_{rr}	--	26	--	nC

Notes:

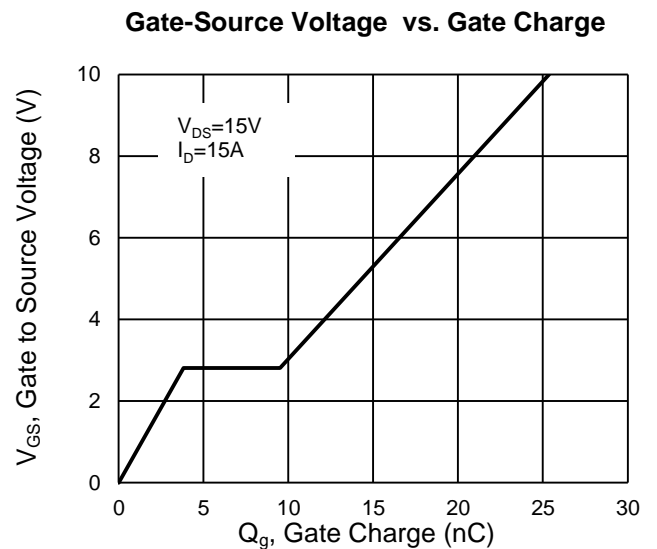
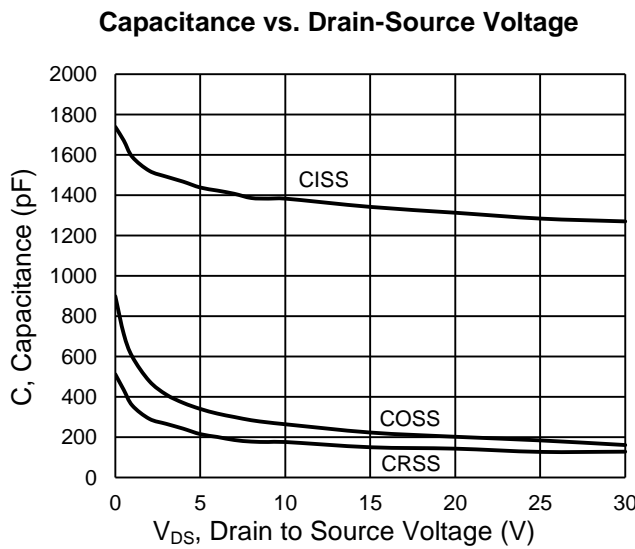
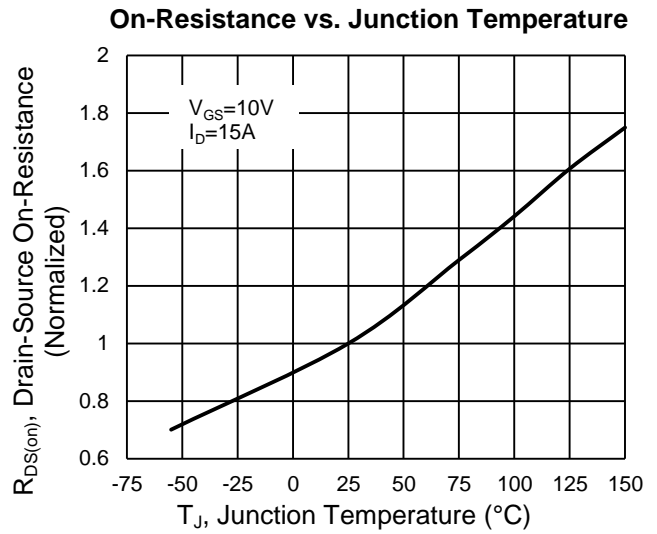
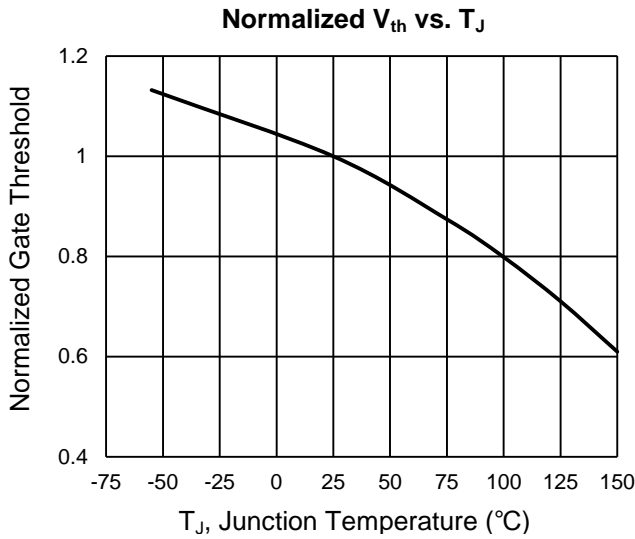
- Current limited by package.
- $L = 0.1\text{mH}, V_{GS} = 10\text{V}, V_{DS} = 25\text{V}, R_G = 25\Omega, I_{AS} = 29\text{A}, \text{Starting } T_J = 25^\circ\text{C}$
- Pulse test: Pulse Width $\leq 300\mu\text{s}$, duty cycle $\leq 2\%$.
- Switching time is essentially independent of operating temperature.

ORDERING INFORMATION

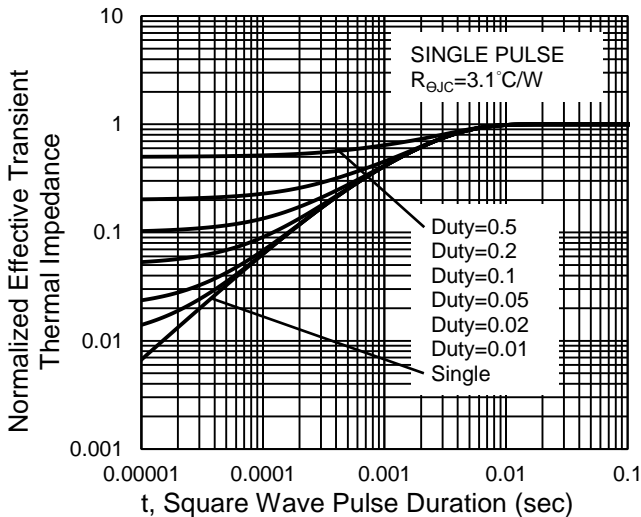
PART NO.	PACKAGE	PACKING
TSM060N03PQ33 RGG	PDFN33	5,000pcs / 13" Reel

CHARACTERISTICS CURVES

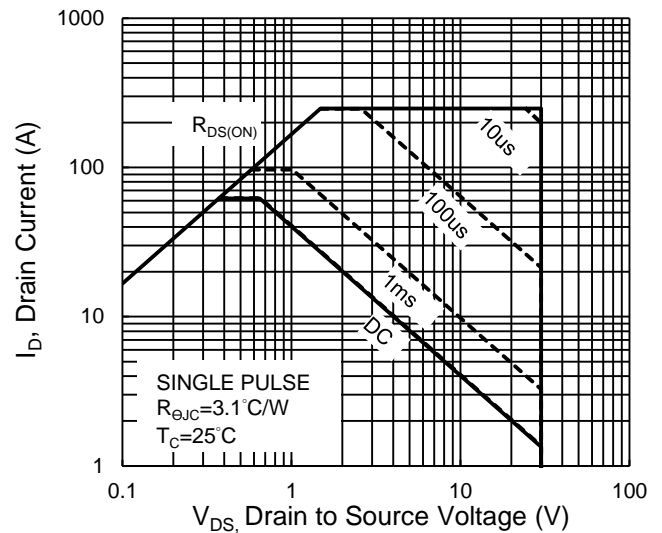
($T_A = 25^\circ\text{C}$ unless otherwise noted)



Normalized Thermal Transient Impedance, Junction-to-Case

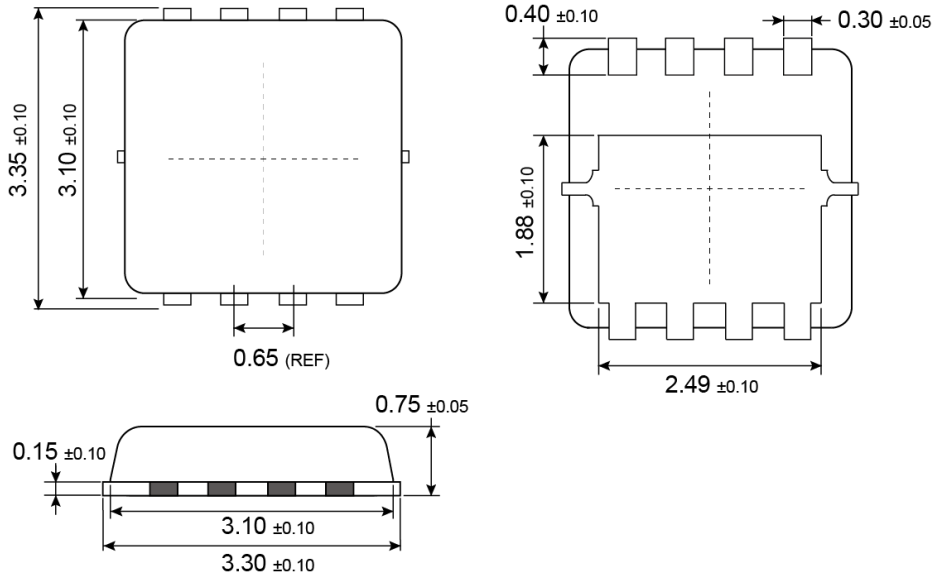


Maximum Safe Operating Area, Junction-to-Case

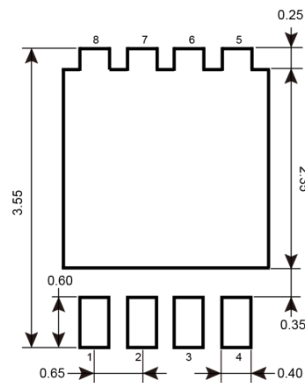


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

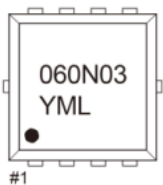
PDFN33



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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