

## N-Channel Power MOSFET

30V, 80A, 3.8mΩ

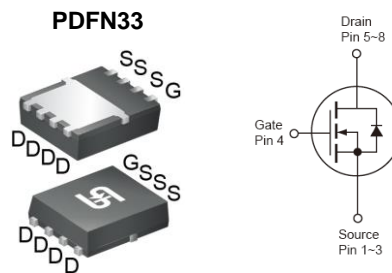
### FEATURES

- 100% avalanche tested
- Fast switching
- Pb-free plating
- RoHS compliant
- Halogen-free mold compound

### APPLICATION

- Mobile device DC-DC conversion
- Point of Load (POL) DC-DC
- Secondary Switch Rectification

KEY PERFORMANCE PARAMETERS		
PARAMETER	VALUE	UNIT
$V_{DS}$	30	V
$R_{DS(on)}$ (max)	$V_{GS}=10V$	3.8
	$V_{GS}=4.5V$	5.5
$Q_g$	24	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 (Note 1)	$I_D$	$T_C = 25^\circ\text{C}$	80
		$T_C = 100^\circ\text{C}$	51
Pulsed Drain Current (Note 2)	$I_{DM}$	320	A
Single Pulsed Avalanche Energy (Note 3)	$E_{AS}$	125	mJ
Single Pulsed Avalanche Current (Note 3)	$I_{AS}$	50	A
Total Power Dissipation @ $T_C = 25^\circ\text{C}$	$P_{DTOT}$	66	W
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	$^\circ\text{C/W}$
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	$V_{DS} = V_{GS}, I_D = 250\mu A$	$V_{GS(TH)}$	1.2	1.6	2.5	V
Gate Body Leakage	$V_{GS} = \pm 20V, V_{DS} = 0V$	$I_{GSS}$	--	--	$\pm 100$	nA
Zero Gate Voltage Drain Current	$V_{DS} = 30V, V_{GS} = 0V$	$I_{DSS}$	--	--	1	$\mu A$
Drain-Source On-State Resistance	$V_{GS} = 10V, I_D = 24A$	$R_{DS(ON)}$	--	2.9	3.8	m $\Omega$
	$V_{GS} = 4.5V, I_D = 12A$		--	4.3	5.5	
<b>Dynamic</b> (Note 5)						
Total Gate Charge	$V_{DS} = 15V, I_D = 24A,$ $V_{GS} = 4.5V$	$Q_g$	--	24	--	nC
Gate-Source Charge		$Q_{gs}$	--	4.2	--	
Gate-Drain Charge		$Q_{gd}$	--	13	--	
Input Capacitance	$V_{DS} = 15V, V_{GS} = 0V,$ $f = 1.0\text{MHz}$	$C_{iss}$	--	2200	--	pF
Output Capacitance		$C_{oss}$	--	280	--	
Reverse Transfer Capacitance		$C_{rss}$	--	177	--	
<b>Switching</b> (Note 6)						
Turn-On Delay Time	$V_{GS} = 10V, V_{DS} = 15V,$ $R_G = 3.3\Omega, I_D = 15A$	$t_{d(on)}$	--	12.6	--	ns
Turn-On Rise Time		$t_r$	--	19.5	--	
Turn-Off Delay Time		$t_{d(off)}$	--	42.8	--	
Turn-Off Fall Time		$t_f$	--	13.2	--	
<b>Source-Drain Diode</b> (Note 4)						
Diode Forward Voltage	$V_{GS}=0V, I_S=10A$	$V_{SD}$	--	--	1	V

**Notes:**

1. Current limited by package
2. Pulse width limited by the maximum junction temperature
3.  $L = 0.1\text{mH}, I_{AS} = 50A, V_{DD} = 50V, R_G = 25\Omega$ , 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**

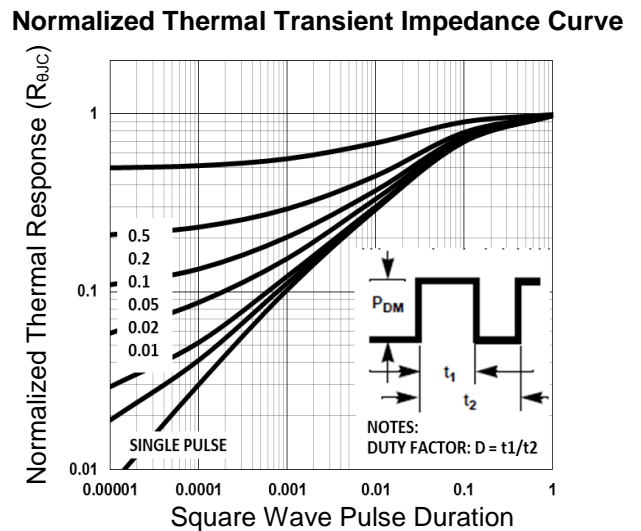
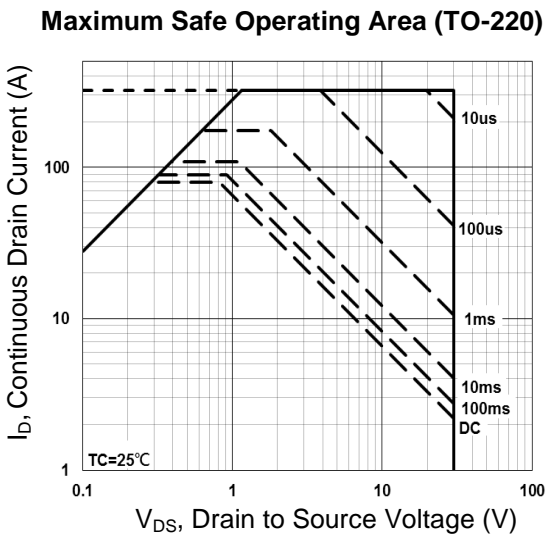
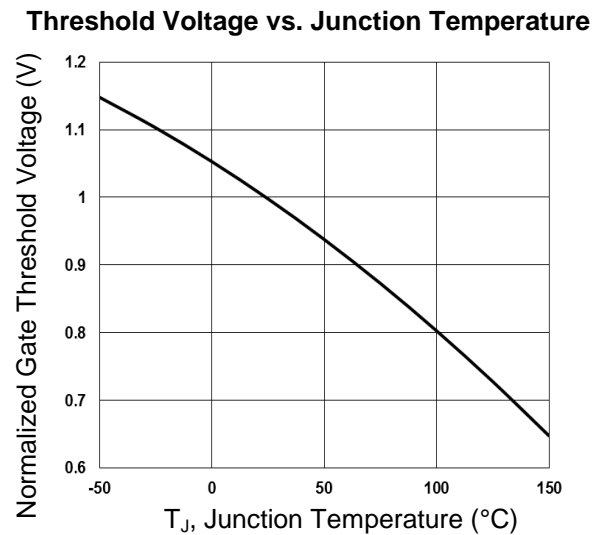
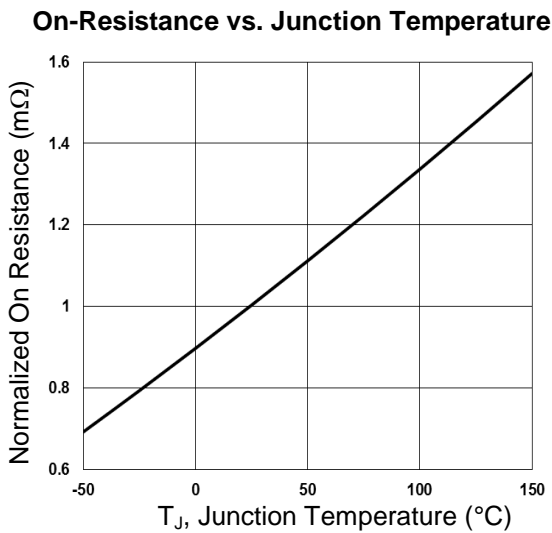
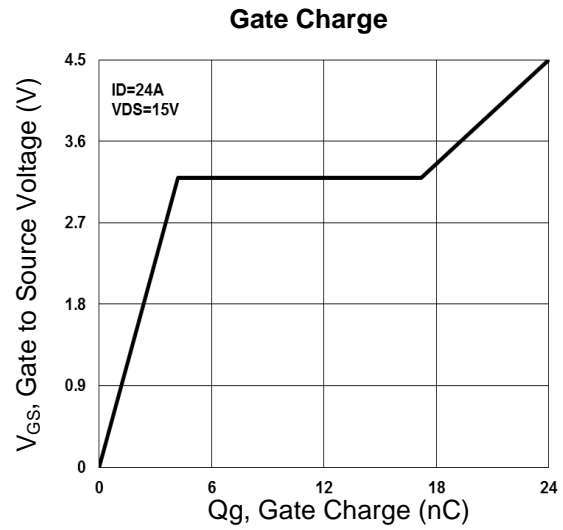
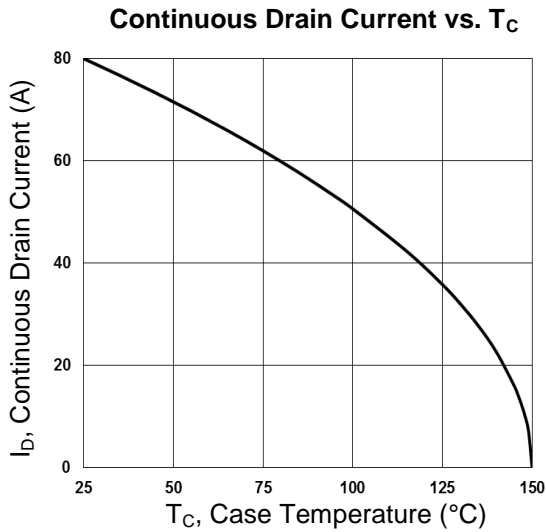
<b>PART NO.</b>	<b>PACKAGE</b>	<b>PACKING</b>
TSM038N03PQ33 RGG	PDFN33	5,000pcs / 13"Reel

**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

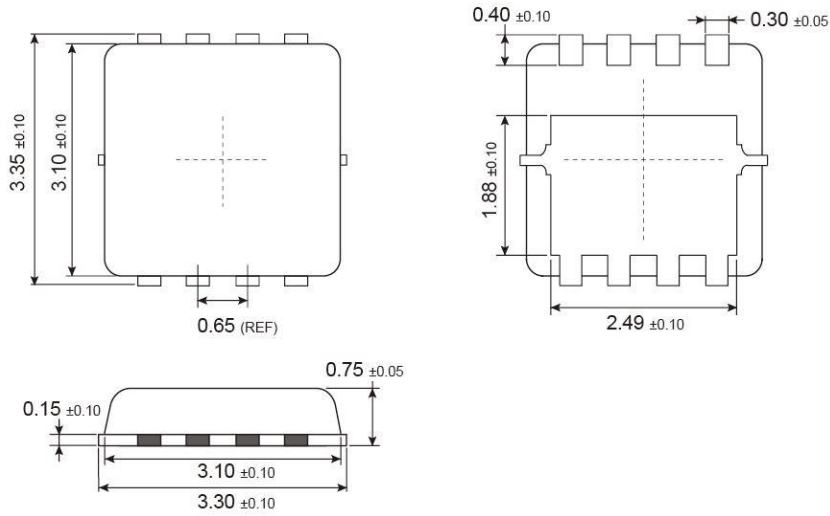
**CHARACTERISTICS CURVES**

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

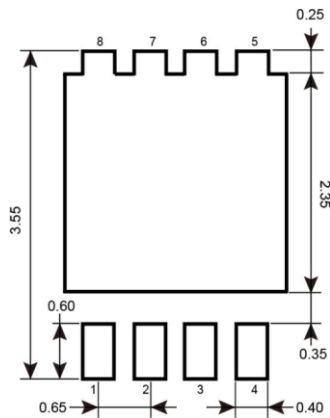


**PACKAGE OUTLINE DIMENSIONS** (Unit: Millimeters)

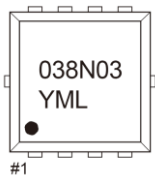
**PDFN33**



**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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