

N-Channel Power MOSFET

40V, 44A, 11mΩ

FEATURES

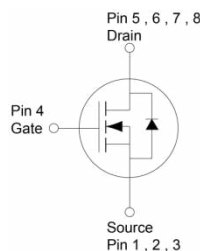
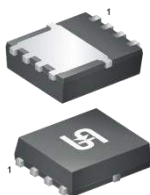
- Low $R_{DS(ON)}$ to minimize conductive losses
- Logic level
- Low gate charge for fast power switching
- 100% UIS and R_g Tested
- RoHS Compliant
- Halogen-free according to IEC 61249-2-21

KEY PERFORMANCE PARAMETERS

PARAMETER	VALUE	UNIT
V_{DS}	40	V
$R_{DS(on)}$ (max)	$V_{GS} = 10V$	11
	$V_{GS} = 4.5V$	16
Q_g	12	nC

APPLICATIONS

- BLDC Motor Control
- Battery Power Management
- DC-DC Converter
- Secondary Synchronous Rectification


PDFN33


Note: 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}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ^(Note 1)	I_D	$T_C = 25^\circ\text{C}$	44
		$T_A = 25^\circ\text{C}$	9
Pulsed Drain Current	I_{DM}	176	A
Single Pulse Avalanche Current ^(Note 2)	I_{AS}	14	A
Single Pulse Avalanche Energy ^(Note 2)	E_{AS}	29	mJ
Total Power Dissipation	P_D	$T_C = 25^\circ\text{C}$	42
		$T_C = 125^\circ\text{C}$	8
Total Power Dissipation	P_D	$T_A = 25^\circ\text{C}$	1.9
		$T_A = 125^\circ\text{C}$	0.4
Operating Junction and Storage Temperature Range	T_J, T_{STG}	- 55 to +150	$^\circ\text{C}$

THERMAL PERFORMANCE

PARAMETER	SYMBOL	MAXIMUM	UNIT
Junction to Case Thermal Resistance	$R_{\theta JC}$	3	$^\circ\text{C/W}$
Junction to Ambient Thermal Resistance	$R_{\theta JA}$	65	$^\circ\text{C/W}$

Thermal Performance Note: $R_{\theta JA}$ 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. $R_{\theta JC}$ is guaranteed by design while $R_{\theta CA}$ is determined by the user's board design. The $R_{\theta JA}$ limit presented here is based on mounting on a 1 in² pad of 2 oz copper.

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

PARAMETER	CONDITIONS	SYMBOL	MIN	TYP	MAX	UNIT
Static						
Drain-Source Breakdown Voltage	$V_{GS} = 0V, I_D = 250\mu A$	BV_{DSS}	40	--	--	V
Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\mu A$	$V_{GS(TH)}$	1	1.7	2.5	V
Gate-Source Leakage Current	$V_{GS} = \pm 20V, V_{DS} = 0V$	I_{GSS}	--	--	± 100	nA
Drain-Source Leakage Current	$V_{GS} = 0V, V_{DS} = 40V$	I_{DSS}	--	--	1	μA
	$V_{GS} = 0V, V_{DS} = 40V$ $T_J = 125^\circ\text{C}$		--	--	100	
Drain-Source On-State Resistance (Note 3)	$V_{GS} = 10V, I_D = 9A$	$R_{DS(on)}$	--	7	11	m Ω
	$V_{GS} = 4.5V, I_D = 8A$		--	10	16	
Forward Transconductance (Note 3)	$V_{DS} = 10V, I_D = 9A$	g_{fs}	--	35	--	S
Dynamic (Note 4)						
Total Gate Charge	$V_{GS} = 10V, V_{DS} = 20V,$ $I_D = 9A$	Q_g	--	24	--	nC
Total Gate Charge	$V_{GS} = 4.5V, V_{DS} = 20V,$ $I_D = 8A$	Q_g	--	12	--	
Gate-Source Charge		Q_{gs}	--	4	--	
Gate-Drain Charge		Q_{gd}	--	6	--	
Input Capacitance	$V_{GS} = 0V, V_{DS} = 20V,$ $f = 1.0\text{MHz}$	C_{iss}	--	1329	--	pF
Output Capacitance		C_{oss}	--	147	--	
Reverse Transfer Capacitance		C_{rss}	--	82	--	
Gate Resistance	$f = 1.0\text{MHz}$	R_g	0.7	2.3	4.6	Ω
Switching (Note 4)						
Turn-On Delay Time	$V_{GS} = 10V, V_{DS} = 20V,$ $I_D = 9A, R_G = 2\Omega$	$t_{d(on)}$	--	3	--	ns
Turn-On Rise Time		t_r	--	23	--	
Turn-Off Delay Time		$t_{d(off)}$	--	16	--	
Turn-Off Fall Time		t_f	--	20	--	
Source-Drain Diode						
Forward Voltage (Note 3)	$V_{GS} = 0V, I_S = 9A$	V_{SD}	--	--	1.2	V
Reverse Recovery Time	$I_S = 9A,$ $di/dt = 100A/\mu s$	t_{rr}	--	14	--	ns
Reverse Recovery Charge		Q_{rr}	--	7	--	nC

Notes:

1. Silicon limited current only.
2. $L = 0.3\text{mH}, V_{GS} = 10V, V_{DD} = 30V, R_G = 25\Omega, I_{AS} = 14A,$ Starting $T_J = 25^\circ\text{C}$
3. Pulse test: Pulse Width $\leq 300\mu s,$ duty cycle $\leq 2\%$.
4. Switching time is essentially independent of operating temperature.

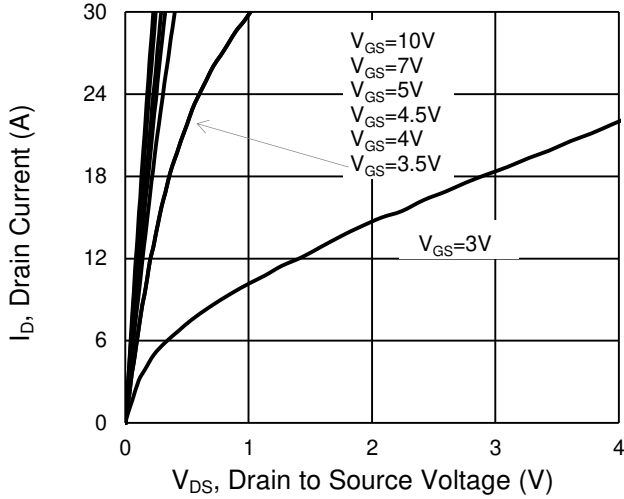
ORDERING INFORMATION

ORDERING CODE	PACKAGE	PACKING
TSM110NB04LCV RGG	PDFN33	5,000pcs / 13" Reel

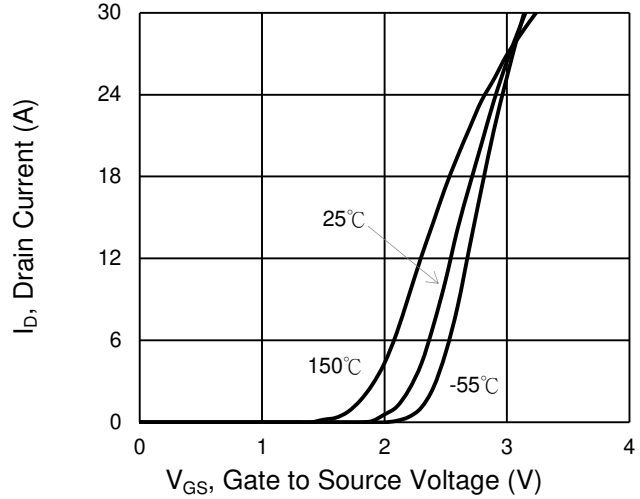
CHARACTERISTICS CURVES

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

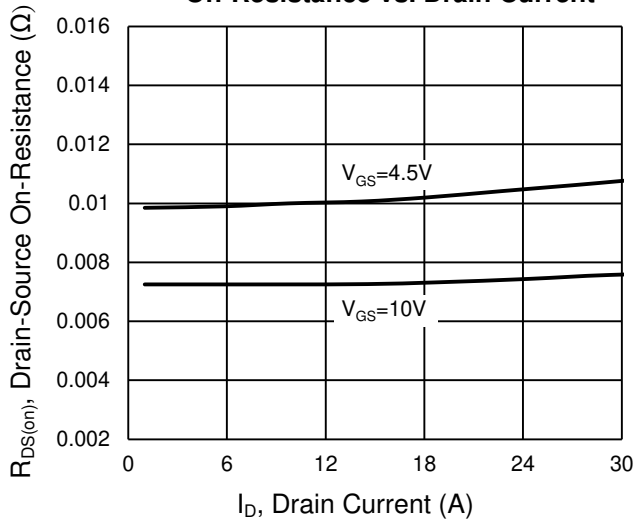
Output Characteristics



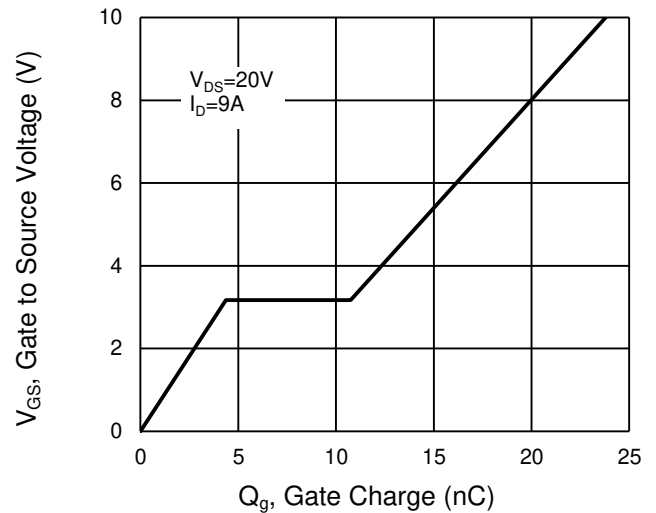
Transfer Characteristics



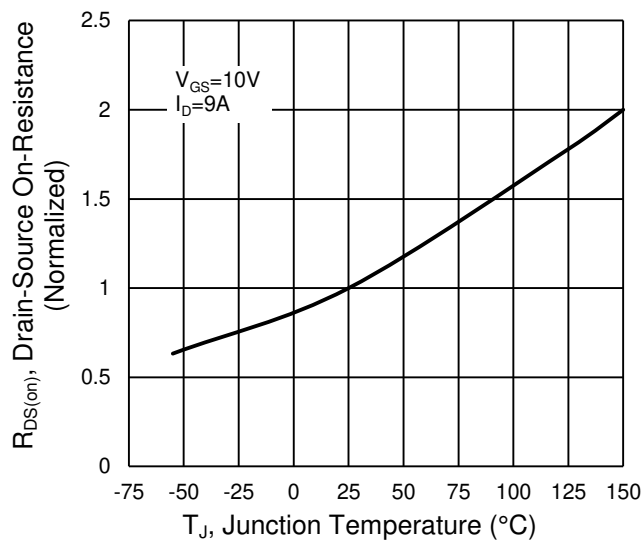
On-Resistance vs. Drain Current



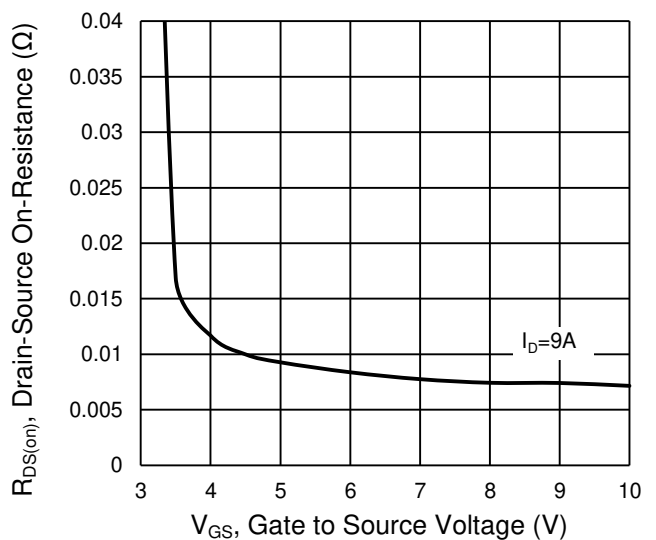
Gate-Source Voltage vs. Gate Charge



On-Resistance vs. Junction Temperature

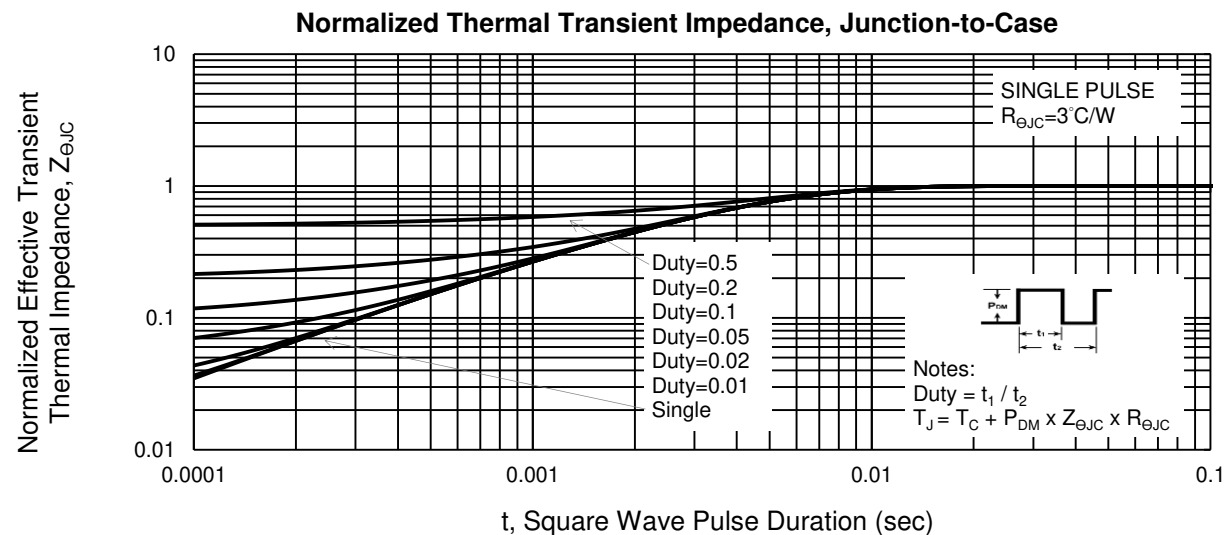
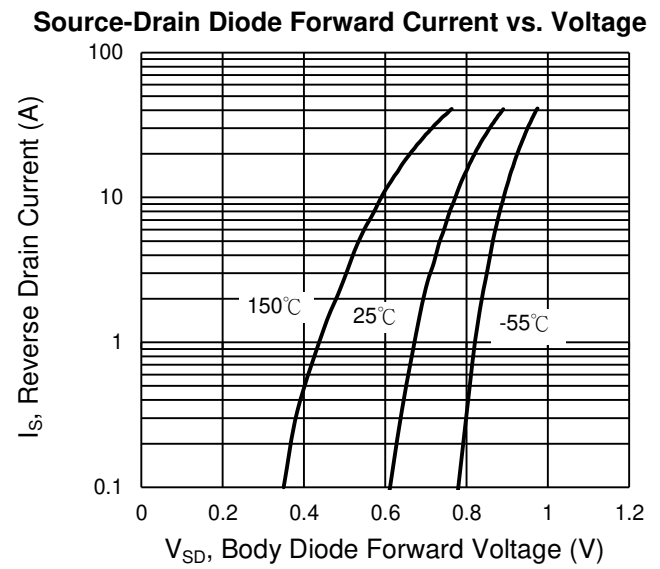
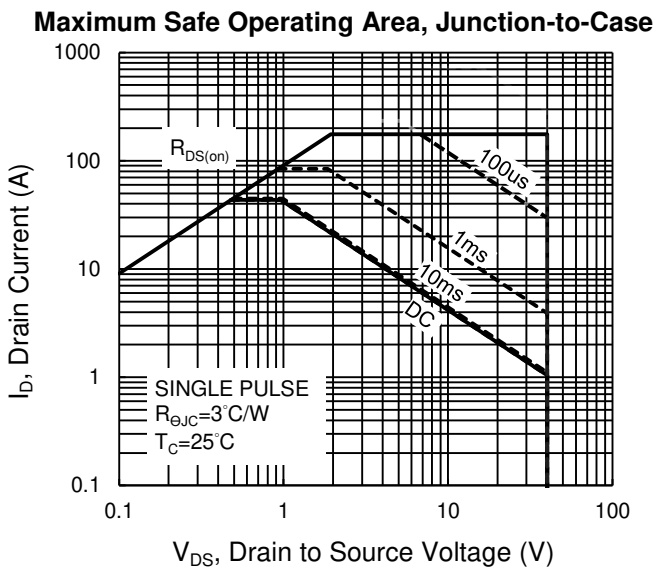
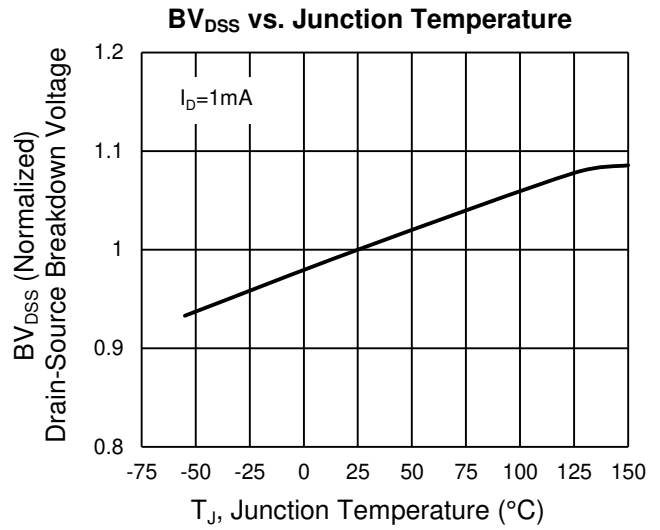
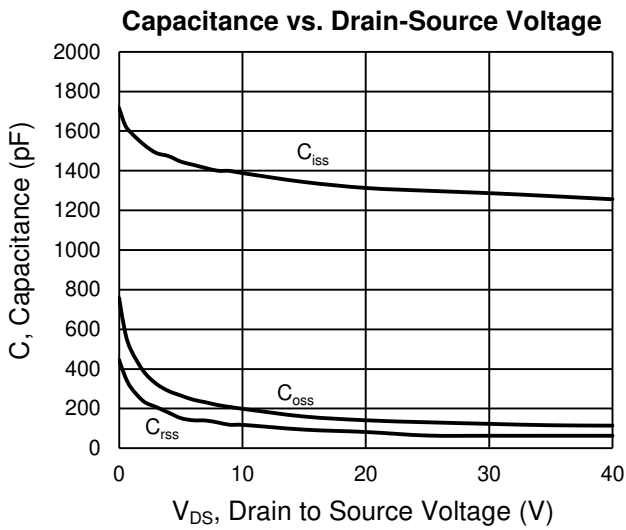


On-Resistance vs. Gate-Source Voltage



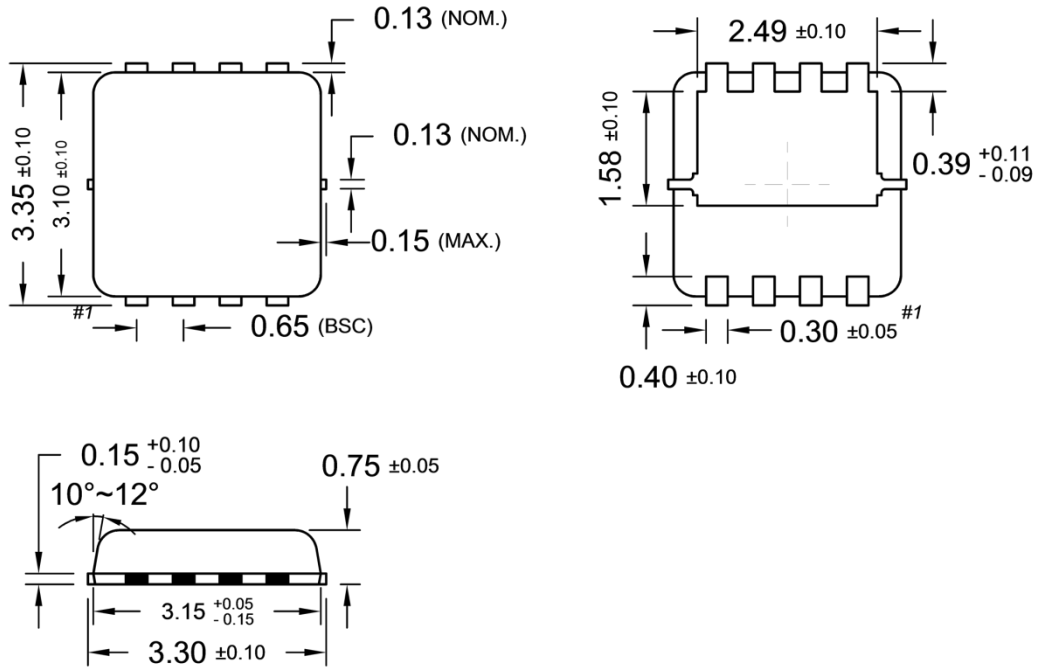
CHARACTERISTICS CURVES

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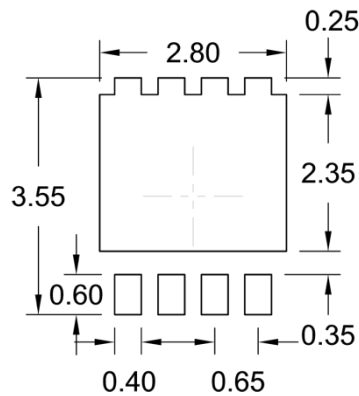


PACKAGE OUTLINE DIMENSIONS (Unit: Millimeters)

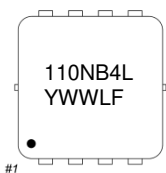
PDFN33



SUGGESTED PAD LAYOUT (Unit: Millimeters)



MARKING DIAGRAM



- Y** = Year Code
- WW** = Week Code (01~52)
- L** = Lot Code (1~9,A~Z)
- F** = Factory Code

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