



# NTBG045N065SC1

## THERMAL CHARACTERISTICS

Parameter	Symbol	Max	Unit
Junction-to-Case – Steady State (Note 2)	$R_{\theta JC}$	0.62	°C/W
Junction-to-Ambient – Steady State (Notes 1, 2)	$R_{\theta JA}$	40	°C/W

## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	650	-	-	V	
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	$I_D = 20\text{ mA}$ , refer to $25^\circ\text{C}$	-	0.13	-	V/°C	
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{GS} = 0\text{ V},$ $V_{DS} = 650\text{ V}$	$T_J = 25^\circ\text{C}$	-	-	10	$\mu\text{A}$
			$T_J = 175^\circ\text{C}$	-	-	1	mA
Gate-to-Source Leakage Current	$I_{GSS}$	$V_{GS} = +18/-5\text{ V}, V_{DS} = 0\text{ V}$	-	-	250	nA	

### ON CHARACTERISTICS

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 8\text{ mA}$	1.8	2.8	4.3	V	
Recommended Gate Voltage	$V_{GOP}$		-5	-	+18	V	
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 15\text{ V}, I_D = 25\text{ A}, T_J = 25^\circ\text{C}$	-	45	-	m $\Omega$	
			$V_{GS} = 18\text{ V}, I_D = 25\text{ A}, T_J = 25^\circ\text{C}$	-	31		50
			$V_{GS} = 18\text{ V}, I_D = 25\text{ A}, T_J = 175^\circ\text{C}$	-	40		-
Forward Transconductance	$g_{FS}$	$V_{DS} = 10\text{ V}, I_D = 25\text{ A}$	-	16	-	S	

### CHARGES, CAPACITANCES & GATE RESISTANCE

Input Capacitance	$C_{ISS}$	$V_{GS} = 0\text{ V}, f = 1\text{ MHz},$ $V_{DS} = 325\text{ V}$	-	1890	-	pF
Output Capacitance	$C_{OSS}$		-	168	-	
Reverse Transfer Capacitance	$C_{RSS}$		-	15	-	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = -5/18\text{ V}, V_{DS} = 520\text{ V},$ $I_D = 25\text{ A}$	-	105	-	nC
Gate-to-Source Charge	$Q_{GS}$		-	27	-	
Gate-to-Drain Charge	$Q_{GD}$		-	30	-	
Gate-Resistance	$R_G$	$f = 1\text{ MHz}$	-	3.1	-	$\Omega$

### SWITCHING CHARACTERISTICS

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = -5/18\text{ V}, V_{DS} = 400\text{ V},$ $I_D = 25\text{ A}, R_G = 2.2\ \Omega,$ Inductive Load	-	13	-	ns
Rise Time	$t_r$		-	14	-	
Turn-Off Delay Time	$t_{d(OFF)}$		-	26	-	
Fall Time	$t_f$		-	7	-	
Turn-On Switching Loss	$E_{ON}$		-	47	-	$\mu\text{J}$
Turn-Off Switching Loss	$E_{OFF}$		-	33	-	
Total Switching Loss	$E_{TOT}$		-	80	-	

### SOURCE-DRAIN DIODE CHARACTERISTICS

Continuous Source-Drain Diode Forward Current	$I_{SD}$	$V_{GS} = -5\text{ V}, T_J = 25^\circ\text{C}$	-	-	56	A
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## ELECTRICAL CHARACTERISTICS ( $T_J = 25^\circ\text{C}$ unless otherwise stated)(continued)

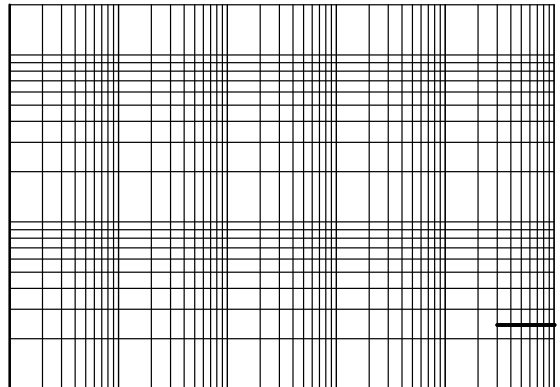
Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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SOURCE-



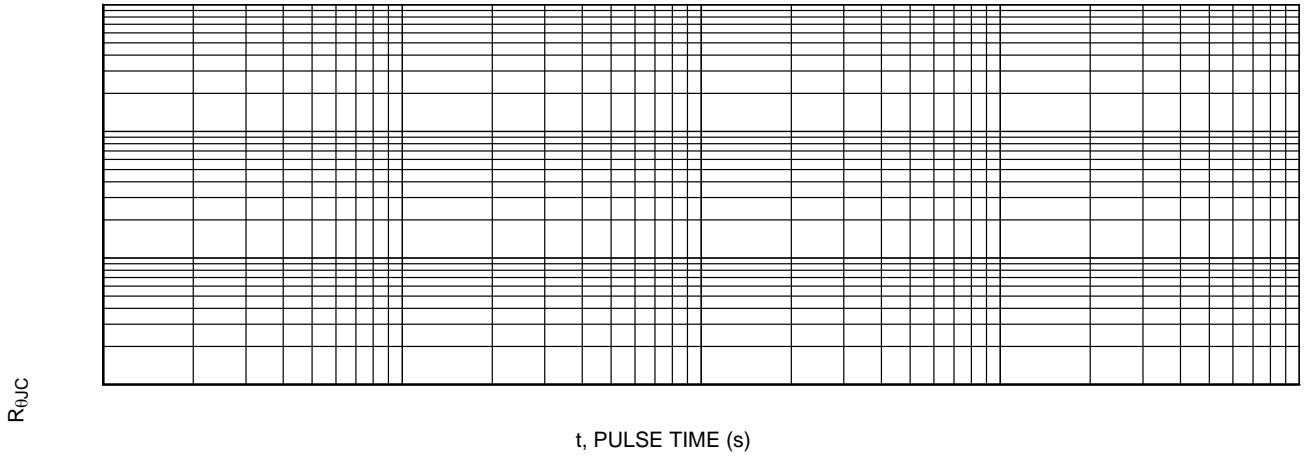
# NTBG045N065SC1

## TYPICAL CHARACTERISTICS (continued)



# NTBG045N065SC1

## TYPICAL CHARACTERISTICS (continued)



**Figure 13. Junction-to-Case Transient Thermal Response**

**D<sup>2</sup>PAK7 (TO-263-7L HV)**  
CASE 418BJ  
ISSUE B

DATE 16 AUG 2019

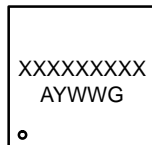
A

c2

H

C

**GENERIC  
MARKING DIAGRAM\***



XXXX = Specific Device Code  
A = Assembly Location  
Y = Year  
WW = Work Week  
G = Pb-Free Package

\*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G" or microdot "◦", may or may not be present. Some products may not follow the Generic Marking.

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