

40V N-Channel MOSFET

Product Summary

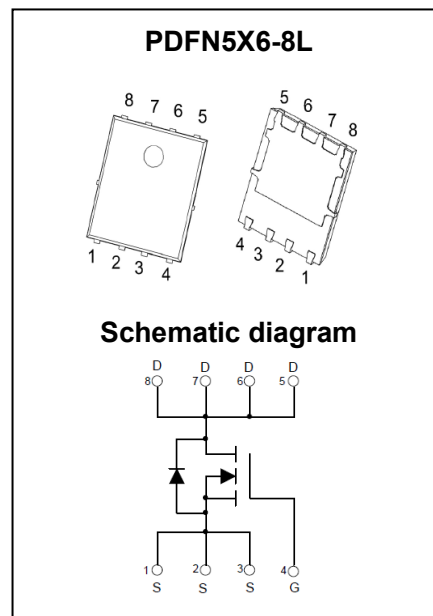
$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
40V	0.8m Ω @10V	300A
	1.9m Ω @4.5V	

Feature

- Split Gate Trench Technology
- Low $R_{DS(ON)}$
- Low Gate Charge
- Low Gate Resistance
- 100% UIS Tested

Application

- Power Management
- Load Switching



Package Marking and Ordering Information

Part Number	Package	Marking	Packing	Reel Size	Tape Width	Qty
T009N04LNCU	PDFN5X6-8L	T009N04L	Reel & Tape	330mm	12mm	5000pcs

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current ¹	I_D	$T_C = 25^\circ\text{C}$	300
		$T_C = 100^\circ\text{C}$	190
Pulsed Drain Current ²	I_{DM}	1200	A
Single Pulsed Avalanche Current ³	I_{AS}	50	A
Single Pulsed Avalanche Energy ³	E_{AS}	625	mJ
Power Dissipation ⁵	$T_C = 25^\circ\text{C}$	P_D	156
Thermal Resistance from Junction to Ambient ⁶	$R_{\theta JA}$	40	$^\circ\text{C} / \text{W}$
Thermal Resistance from Junction to Case	$R_{\theta JC}$	0.8	$^\circ\text{C} / \text{W}$
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55~ +150	$^\circ\text{C}$

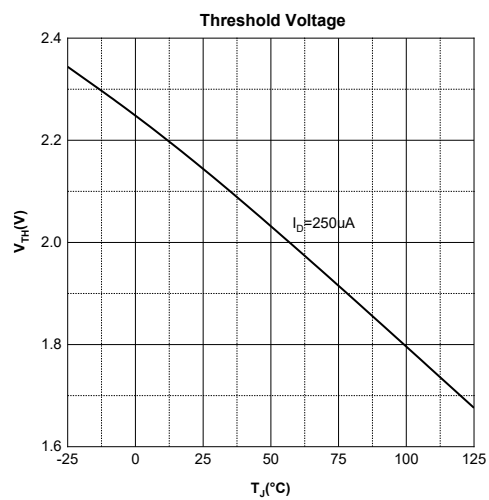
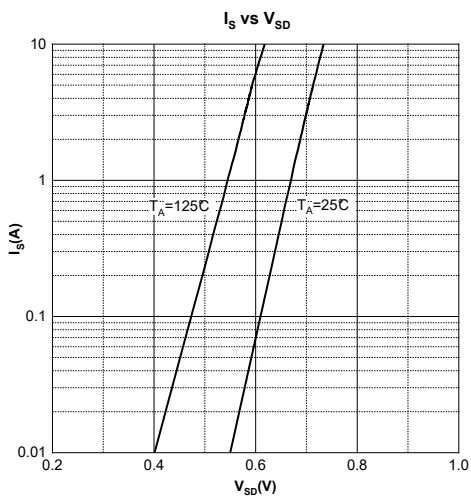
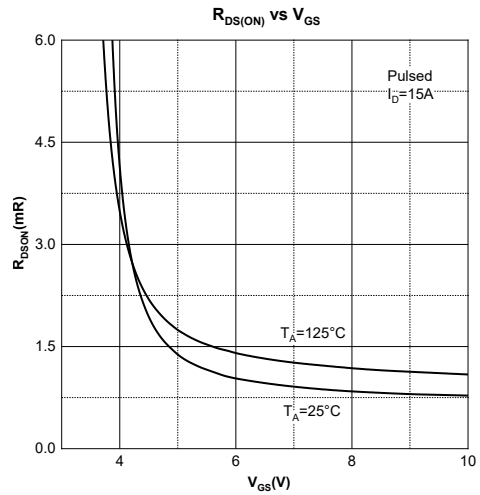
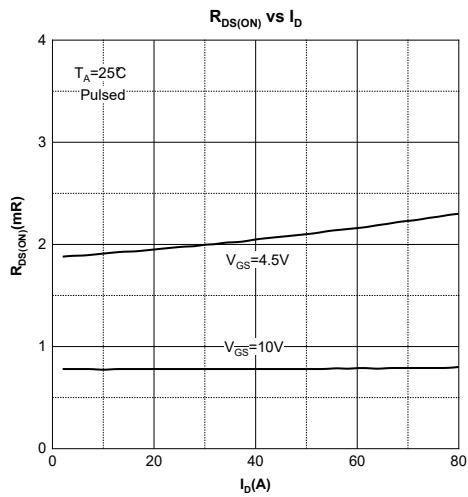
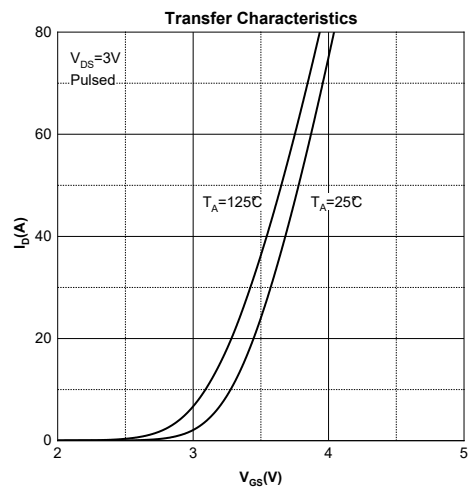
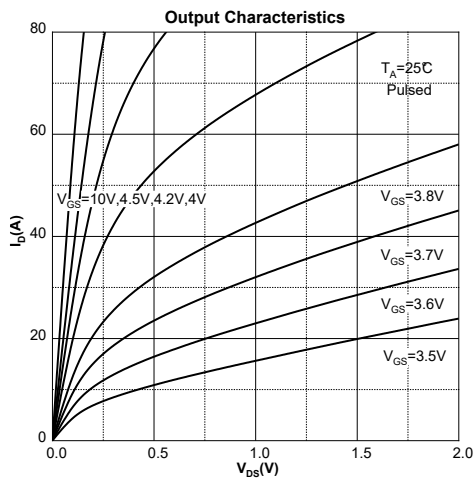
Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Type	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0V, I_D = 250\mu A$	40			V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$			1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$			± 100	nA
On Characteristics⁴						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1	2.1	2.5	V
Drain-Source On-Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 15A$		0.8	1.1	m Ω
		$V_{GS} = 4.5V, I_D = 15A$		1.9	2.8	
Dynamic Characteristics						
Input Capacitance	C_{iss}	$V_{DS} = 20V, V_{GS} = 0V, f = 1MHz$		5097		pF
Output Capacitance	C_{oss}			1542		
Reverse Transfer Capacitance	C_{rss}			153		
Gate Resistance	R_g	$V_{DS} = 0V, V_{GS} = 0V, f = 1MHz$		1.9		Ω
Switching Characteristics						
Total Gate Charge	Q_g	$V_{DS} = 30V, V_{GS} = 10V, I_D = 20A$		83		nC
Gate-Source Charge	Q_{gs}			15.6		
Gate-Drain Charge	Q_{gd}			16.4		
Gate Plateau Voltage	$V_{plateau}$			3.3		V
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 20V, V_{GS} = 10V, R_G = 3\Omega, I_D = 20A$		14		ns
Turn-On Rise Time	t_r			30		
Turn-Off Delay Time	$t_{d(off)}$			65		
Turn-Off Fall Time	t_f			27		
Source-Drain Diode Characteristics						
Diode Forward Voltage ⁴	V_{SD}	$V_{GS} = 0V, I_S = 15A$			1.2	V
Diode Continuous Forward Current ¹	I_S	$T_C = 25^\circ\text{C}$			300	A
Diode Pulse Forward Current ²	I_{SM}				1200	A
Diode Reverse Recovery Time	t_{rr}	$I_F = 10A, di/dt = 100A/\mu s$		67		ns
Diode Reverse Recovery Charge	Q_{rr}			105		nC

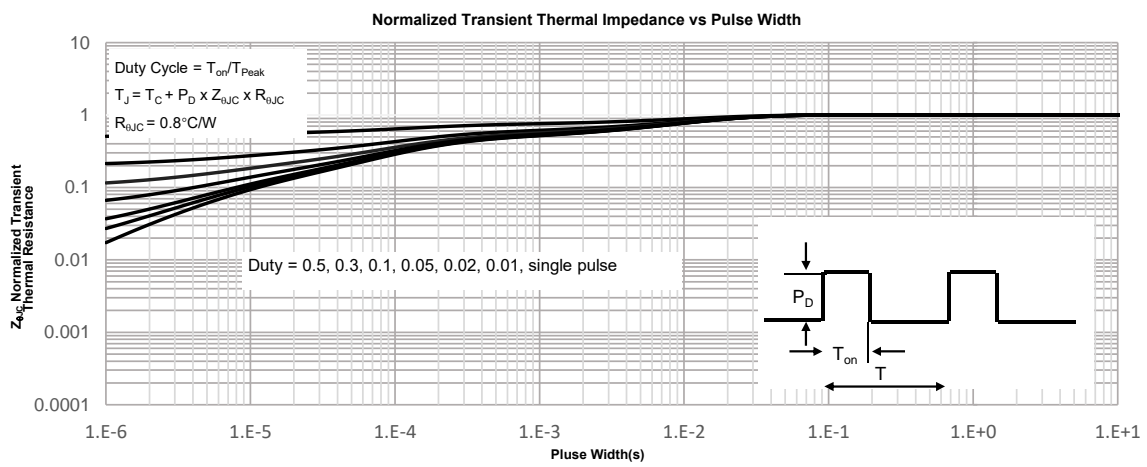
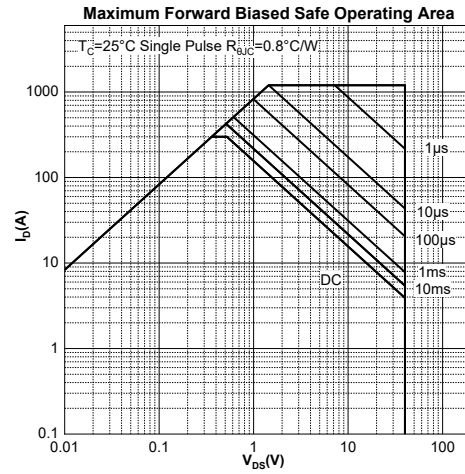
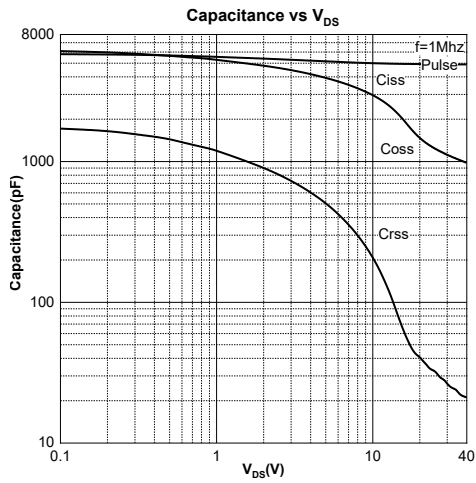
Notes:

- 1.The maximum current rating is limited by package. And device mounted on a large heatsink.
- 2.Pulse Test: Pulse Width $\leq 10\mu s$, duty cycle $\leq 1\%$.
- 3.EAS condition: $V_{DD} = 40V, V_{GS} = 10V, L = 0.5mH, R_G = 25\Omega$ Starting $T_J = 25^\circ\text{C}$.
- 4.Pulse Test: Pulse Width $\leq 300\mu s$, duty cycle $\leq 2\%$.
- 5.The power dissipation P_D is limited by $T_{J(MAX)} = 150^\circ\text{C}$. And device mounted on a large heatsink.
- 6.Device mounted on $1in^2$ FR-4 board with 2oz. Copper, in a still air environment with $T_A = 25^\circ\text{C}$.

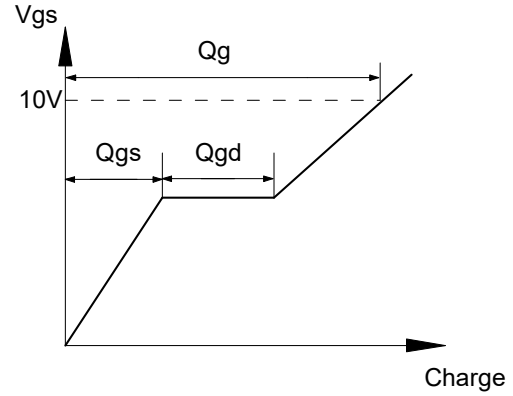
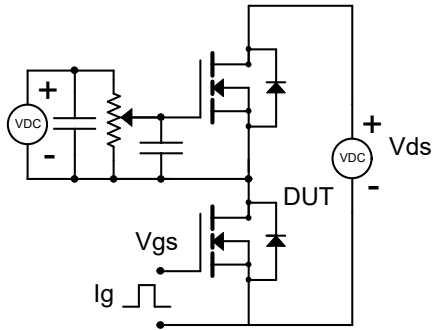
Typical Characteristics



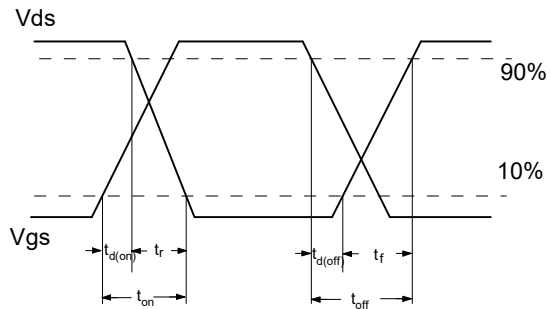
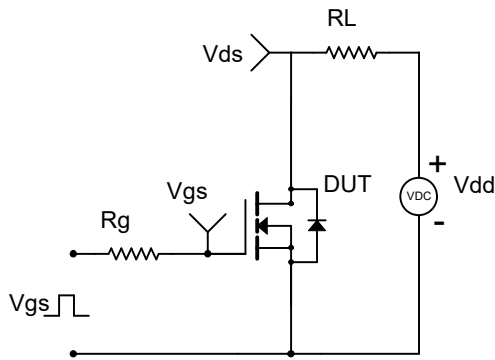
Typical Characteristics



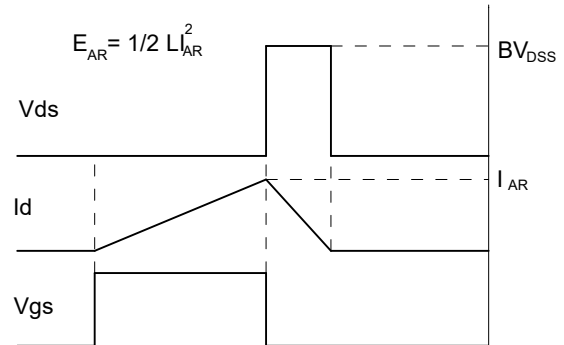
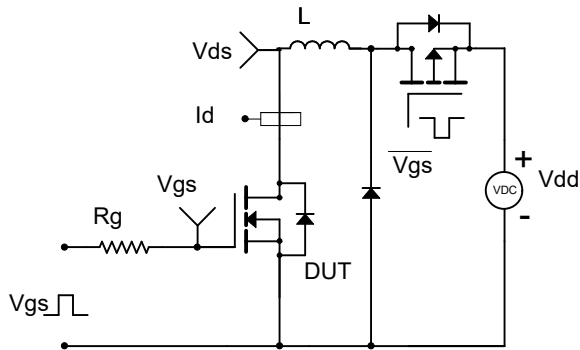
Gate Charge Test Circuit & Waveform

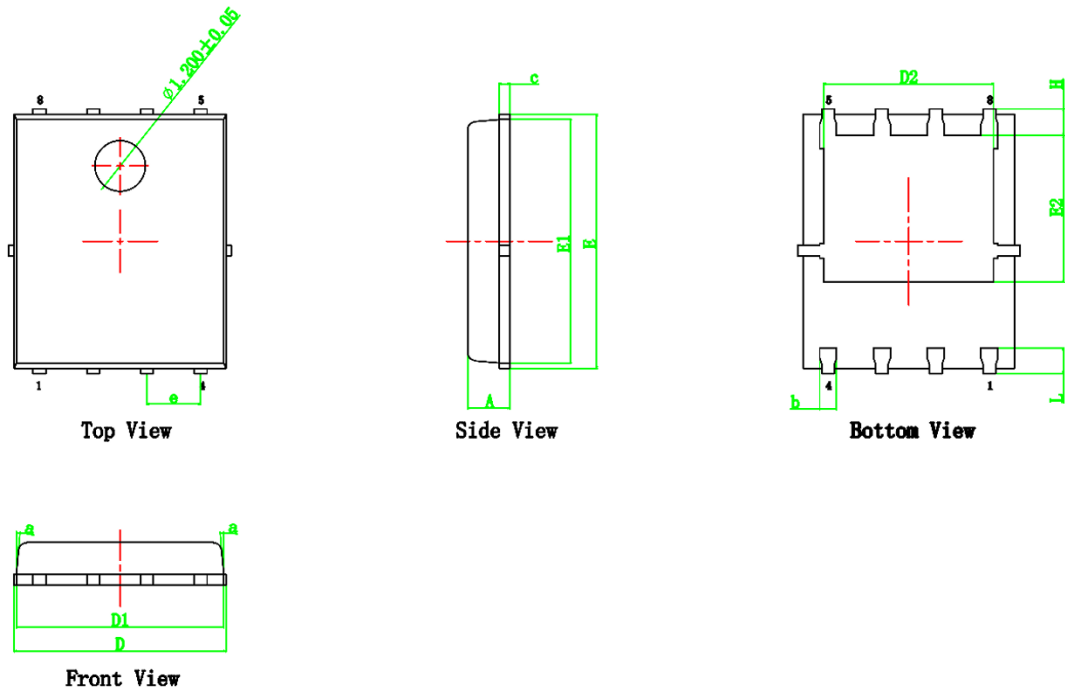


Resistive Switching Test Circuit & Waveform



Unclamped Inductive Switching (UIS) Test Circuit & Waveforms





Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.900	1.200	0.035	0.047
b	0.330	0.510	0.013	0.020
c	0.190	0.300	0.007	0.012
D	4.800	5.220	0.189	0.210
D2	3.900	4.300	0.154	0.170
E	5.900	6.100	0.232	0.240
E1	5.700	5.800	0.224	0.228
E2	3.350	3.750	0.132	0.148
e	1.270REF		0.050REF	
H	0.350	0.720	0.014	0.028
D1	4.800	5.000	0.189	0.197
L	0.350	0.750	0.014	0.030
a	0°	12°	0°	12°