

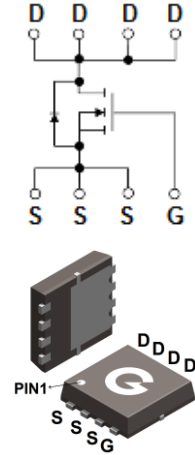
Features

- Advanced Shielded-Gate Trench technology
- Low on-resistance
- Fast switching speed
- Low thermal resistance
- Halogen free
- Qualified to AEC-Q101 standards for high reliability

HF

Mechanical Data

- Case: PDFN3×3-8L
- Molding Compound: UL Flammability Classification Rating 94V-0
- Terminals: Matte tin-plated leads; solderability-per MIL-STD-202, Method 208



PDFN3×3-8L

Ordering Information

Part Number	Package	Shipping Quantity	Marking Code
TQBL090N04T-3DL8	PDFN3×3-8L	5000 pcs / Tape & Reel	090N04T

Maximum Ratings (@ T_C = 25°C unless otherwise specified)

Parameter	Symbol	Value	Unit
Drain-to-Source Voltage	V _{DSS}	40	V
Gate-to-Source Voltage	V _{GSS}	±20	V
Continuous Drain Current (T _C = 25°C)	I _D	47	A
Continuous Drain Current (T _C = 100°C)		33	A
Continuous Drain Current (T _A = 25°C) *1		12.7	A
Continuous Drain Current (T _A = 100°C) *1		9	A
Pulsed Drain Current (t _p = 10μs, T _C = 25°C)	I _{DM}	188	A
Single Pulse Avalanche Energy *3	E _{AS}	13	mJ
Power Dissipation (T _C = 25°C)	P _D	33	W
Operating Junction Temperature Range	T _J	-55 ~ +175	°C
Storage Temperature Range	T _{STG}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Thermal Resistance Junction-to-Case	R _{θJC}	-	4.3	4.5	°C/W
Thermal Resistance Junction-to-Air *1	R _{θJA}	-	51	61	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
Static Characteristics						
V _{DSS}	Drain-Source Breakdown Voltage	V _{GS} = 0V, I _D = 250μA	40	-	-	V
I _{DSS}	Zero Gate Voltage Drain Current	V _{DS} = 40V, V _{GS} = 0V	-	-	1	μA
I _{GSS}	Gate-Body Leakage Current	V _{GS} = ±20V, V _{DS} = 0V	-	-	±100	nA
On Characteristics						
R _{DS(ON)}	Drain-Source On-resistance *2	V _{GS} = 10V, I _D = 12A	-	8	9	mΩ
		V _{GS} = 4.5V, I _D = 10A	-	13	16	mΩ
V _{GS(th)}	Gate Threshold Voltage	V _{DS} = V _{GS} , I _D = 250μA	1	1.7	2.5	V
R _G	Gate Resistance	V _{GS} = 0V, f = 1MHz	-	3.6	-	Ω
Dynamic Characteristics						
C _{ISS}	Input Capacitance	V _{GS} = 0V V _{DS} = 15V f = 1.0MHz	-	694	-	pF
C _{OSS}	Output Capacitance		-	150	-	
C _{RSS}	Reverse Transfer Capacitance		-	140	-	
Switching Characteristics						
t _{d(ON)}	Turn-on Delay Time	V _{DD} = 30V V _{GS} = 15V I _D = 20A R _G = 3.3Ω	-	11	-	ns
t _r	Turn-on Rise Time		-	61	-	
t _{d(OFF)}	Turn-Off Delay Time		-	30	-	
t _f	Turn-Off Fall Time		-	13	-	
Q _G	Total Gate-Charge	V _{DD} = 20V V _{GS} = 4.5V I _D = 12A	-	9.8	-	nC
Q _{GS}	Gate to Source Charge		-	1.8	-	
Q _{GD}	Gate to Drain (Miller) Charge		-	5.8	-	
Source-Drain Diode Characteristics						
V _{SD}	Diode Forward Voltage *2	I _{SD} = 1A, V _{GS} = 0V	-	0.7	1	V
t _{rr}	Reverse Recovery Time	I _{SD} = 15A, V _{GS} = 0V di/dt = 100A/μs	-	21	-	ns
Q _{rr}	Reverse Recovery Charge		-	8.3	-	nC

Notes:

- The data tested by surface mounted on a 1 inch² FR-4 board with 20Z copper
- The data tested by pulsed, pulse width $\leq 300\mu s$, duty cycle $\leq 2\%$
- The E_{AS} data shows Max. rating. The test condition is $V_{DD} = 25V, V_{GS} = 10V, L = 0.1mH$

Ratings and Characteristics Curves (@ $T_A = 25^\circ\text{C}$ unless otherwise specified)

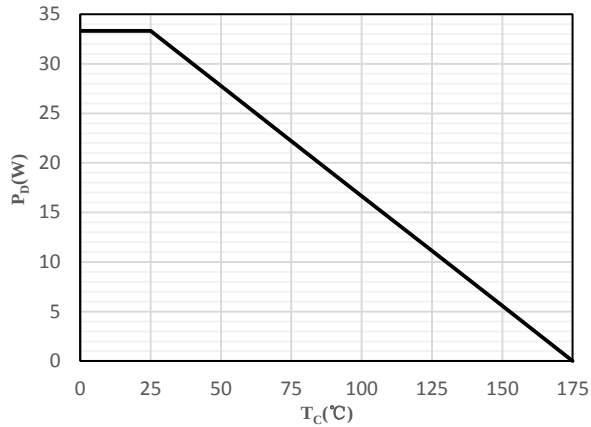


Fig 1 Power Dissipation

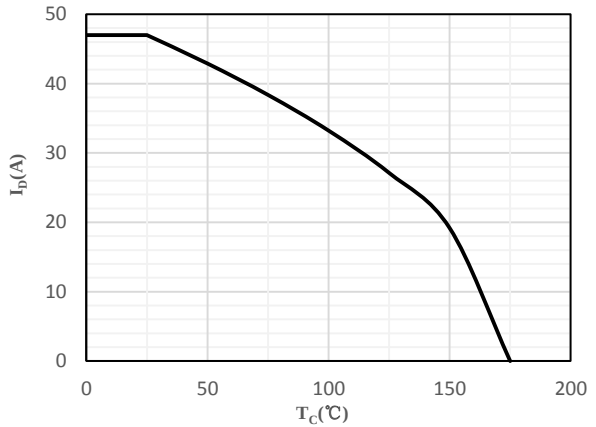


Fig 2 Drain Current

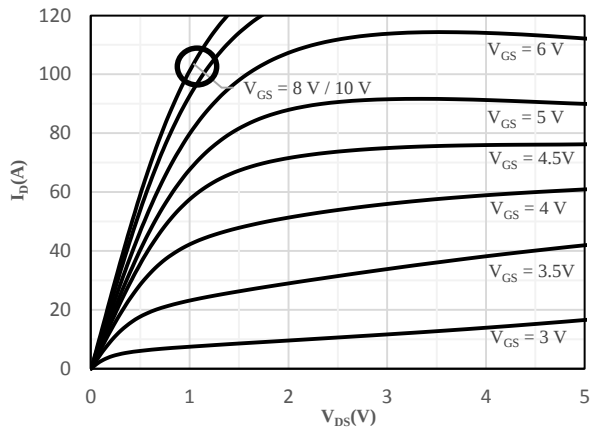


Fig 3 Typical Output Characteristics

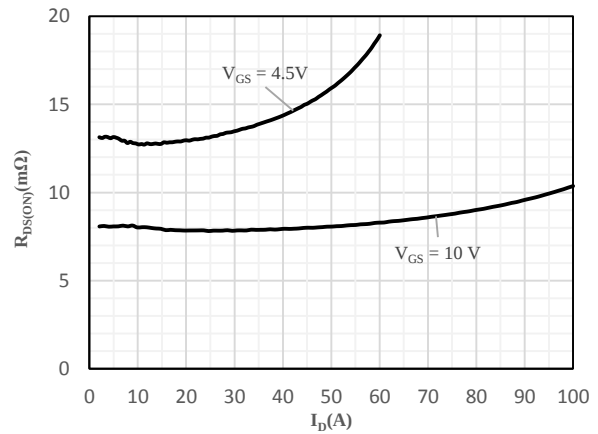


Fig 4 On-Resistance vs. Drain Current
and Gate Voltage

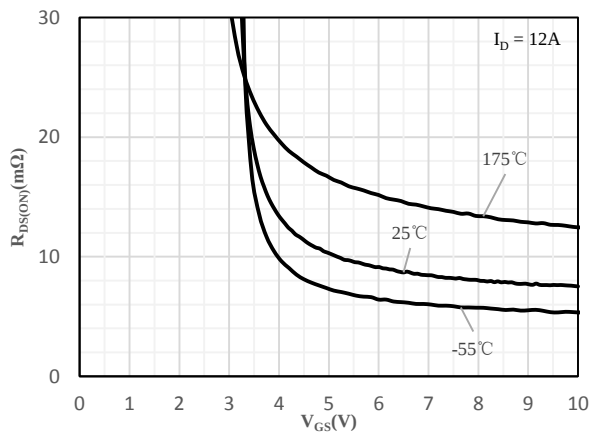


Fig 5 On-Resistance vs. Gate-Source Voltage

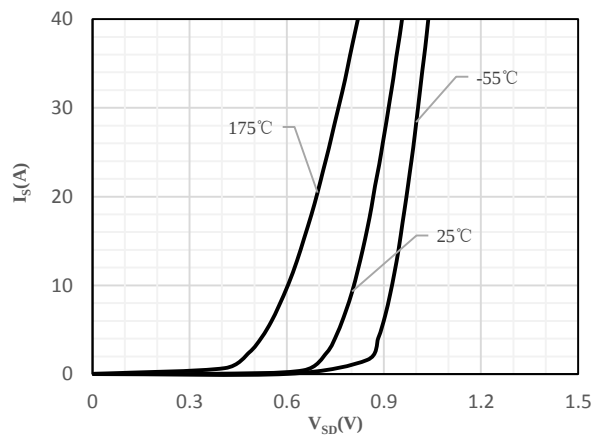


Fig 6 Body-Diode Characteristics

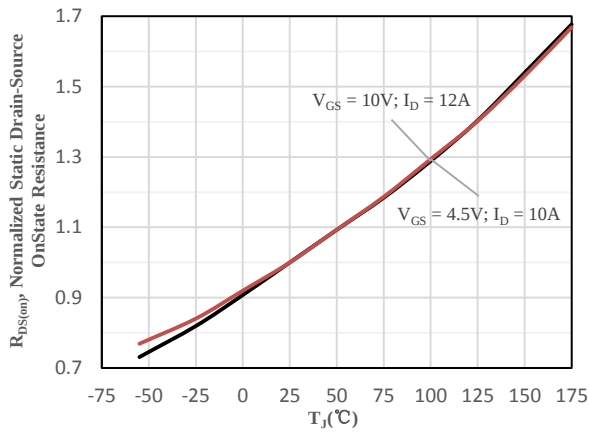


Fig 7 Normalized On-Resistance vs. Junction Temperature

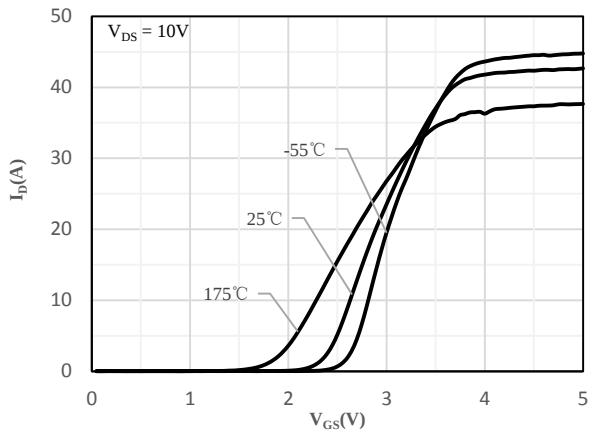


Fig 8 Transfer Characteristics

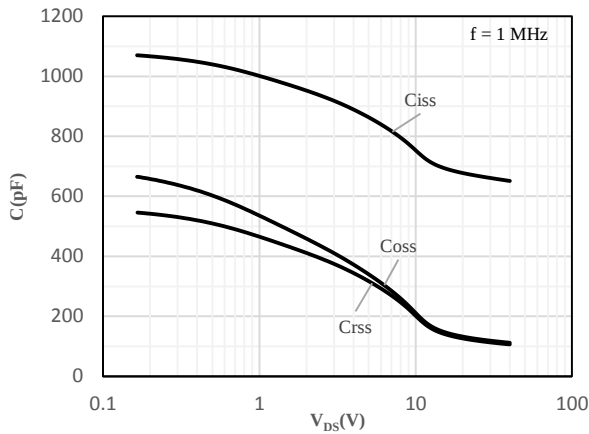


Fig 9 Capacitance Characteristics

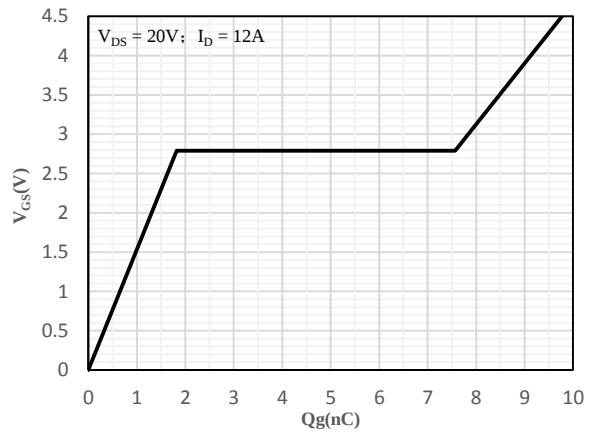


Fig 10 Gate-Charge Characteristics

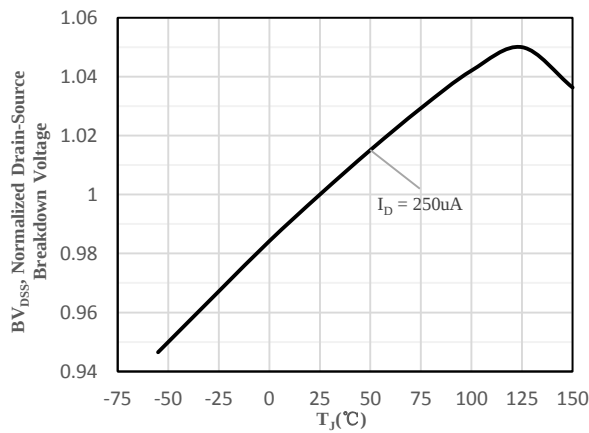


Fig 11 Normalized Breakdown Voltage vs. Junction Temperature

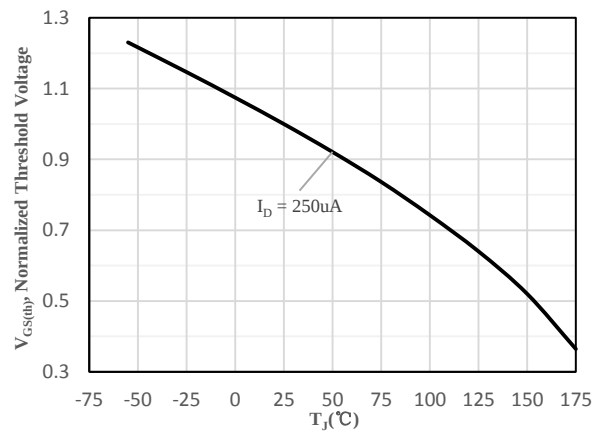


Fig 12 Normalized $V_{GS(th)}$ vs. Junction Temperature

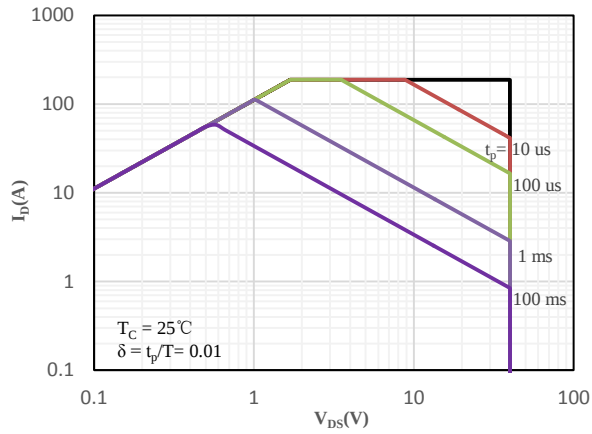


Fig 13 Safe Operating Area

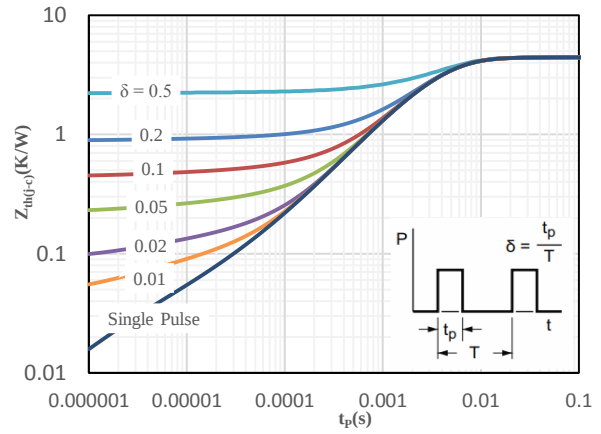
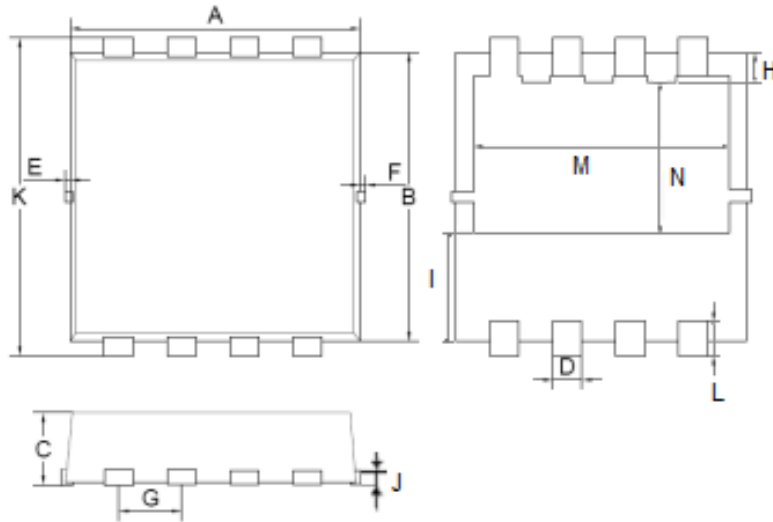


Fig 14 Maximum transient thermal impedance

Package Outline Dimensions (Unit: mm)



PDFN3x3-8L		
Dimension	Min.	Max.
A	2.90	3.10
B	2.90	3.10
C	0.65	0.85
D	0.20	0.40
E	0.00	0.10
F	0.00	0.10
G	0.55	0.75
H	0.20	0.40
I	0.70	1.10
J	0.10	0.20
K	3.15	3.45
L	0.20	0.40
M	2.35	2.55
N	1.500	1.900

Mounting Pad Layout (Unit: mm)

PDFN3x3-8L

