

N-Channel and P-Channel MOSFET

Description

The PDM8N04R40 uses advanced trench technology to provide excellent $R_{DS(on)}$ and low gate charge. This device is suitable for power management and high efficiency applications at high switching frequencies applications.

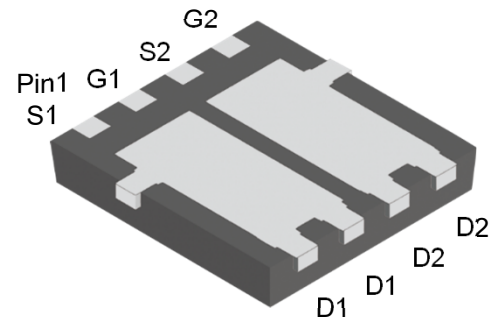
MOSFET Product Summary		
$V_{DS}(V)$	$R_{DS(on)}(m\Omega)(Typ)$	$I_D(A)$
N-Channel 40	16@ $V_{GS} = 10V$	30
	22@ $V_{GS} = 4.5V$	
P-Channel -40	34@ $V_{GS} = -10V$	-20
	45@ $V_{GS} = -4.5V$	

Feature

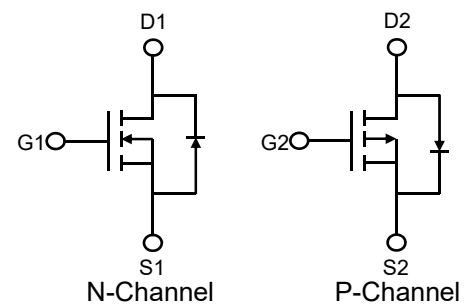
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

Applications

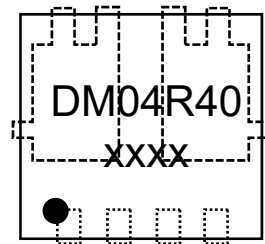
- PWM applications
- Load switch
- Power management
- DC-DC Converters
- Wireless Chargers



**PDFN5060-8L
(Bottom View)**



Circuit Diagram



Pin1

Marking (Top View)

Absolute maximum rating@25°C

Rating	Symbol	N-Channel	P-Channel	Units
Drain-Source Voltage	V_{DS}	40	-40	V
Gate-Source Voltage	V_{GS}	± 20	± 20	V
Drain Current-Continuous ¹⁾	$T_C=25^\circ C$	30	-20	A
	$T_C=100^\circ C$	19	-13	
Pulsed Drain Current ²⁾	I_{DM}	120	-80	A
Total Power Dissipation ³⁾	P_D	32	36	W
Avalanche Current ⁴⁾	I_{AS}	24.7	-28.3	A
Avalanche Energy ⁴⁾	E_{AS}	30.5	40.1	mJ
Thermal Resistance , Junction-to-Case ⁵⁾	$R_{\theta JC}$	3.8	3.5	$^\circ C/W$
Thermal Resistance Junction-to-Ambient ⁶⁾	$R_{\theta JA}$	47.1	45.4	$^\circ C/W$
Junction and Storage Temperature Range	$T_{J, T_{STG}}$	-55~+150	-55~+150	$^\circ C$

Electrical characteristics per line@25°C (unless otherwise specified)(N-Channel)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = 250\mu A$	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 40V, V_{GS} = 0V$	-	-	1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 250\mu A$	1.0	1.6	2.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS} = 10V, I_D = 9A$	-	16	23	m Ω
		$V_{GS} = 4.5V, I_D = 5A$	-	22	36	
Dynamic Characteristics⁷⁾						
Input Capacitance	C_{iss}	$V_{DS} = 20V, V_{GS} = 0V,$ $f = 1MHz$	-	764	-	pF
Output Capacitance	C_{oss}		-	70	-	
Reverse Transfer Capacitance	C_{rss}		-	60	-	
Switching Characteristics⁷⁾						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = 20V, I_D = 9A,$ $V_{GS} = 10V, R_{GEN} = 6\Omega$	-	4.0	-	ns
Turn-on Rise Time	t_r		-	9.0	-	
Turn-Off Delay Time	$t_{d(off)}$		-	24	-	
Turn-Off Fall Time	t_f		-	10	-	
Total Gate Charge	Q_g	$V_{DS} = 20V, I_D = 9A,$ $V_{GS} = 10V$	-	16.6	-	nC
Gate-Source Charge	Q_{gs}		-	1.6	-	
Gate-Drain Charge	Q_{gd}		-	3.1	-	
Gate Resistance	R_g	f=1MHz, Open Drain	-	2.5	-	Ω
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = 1A$	-	0.75	1.2	V

Electrical characteristics per line@25°C (unless otherwise specified)(P-Channel)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS} = 0V, I_D = -250\mu A$	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -40V, V_{GS} = 0V$	-	-	-1.0	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS} = \pm 20V, V_{DS} = 0V$	-	-	± 100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\mu A$	-1.0	-1.7	-2.5	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS} = -10V, I_D = -10A$	-	34	39	m Ω
		$V_{GS} = -4.5V, I_D = -5A$	-	45	54	
Dynamic Characteristics⁷⁾						
Input Capacitance	C_{ISS}	$V_{DS} = -20V, V_{GS} = 0V,$ $f = 1MHz$	-	989	-	pF
Output Capacitance	C_{OSS}		-	88	-	
Reverse Transfer Capacitance	C_{rSS}		-	78	-	
Switching Characteristics⁷⁾						
Turn-on Delay Time	$t_{d(on)}$	$V_{DS} = -20V, V_{GS} = -10V,$ $R_G = 5\Omega, I_D = -10A$	-	6.0	-	ns
Turn-on Rise Time	t_r		-	15	-	
Turn-Off Delay Time	$t_{d(off)}$		-	33	-	
Turn-Off Fall Time	t_f		-	22	-	
Total Gate Charge	Q_g	$V_{DS} = -20V, V_{GS} = -10V,$ $I_D = -7A$	-	16.6	-	nC
Gate-Source Charge	Q_{gs}		-	3.3	-	
Gate-Drain Charge	Q_{gd}		-	2.5	-	
Gate Resistance	R_g	f=1MHz, Open Drain	-	5.5	-	Ω
Drain-Source Diode Characteristics						
Diode Forward Voltage	V_{SD}	$V_{GS} = 0V, I_S = -1A$	-	-0.76	-1.2	V

Notes:

1. Computed continuous current assumes the condition of T_{J_Max} while the actual continuous current depends on the thermal & electro-mechanical application board design.
2. Repetitive Rating: Pulse width limited by maximum junction temperature($T_{J_Max}=150^\circ C$).
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. This single-pulse measurement was taken under the following condition (NMOS:L=0.1mH, $V_{GS}=10V, V_{DS}=40V$; PMOS:L= 0.1mH, $V_{GS}=-10V, V_{DS}=-40V$)while it's value is limited by $T_{J_Max}=150^\circ C$.
5. Device mounted on infinite heatsink.
6. Device mounted on FR-4 substrate PC board, 2oz copper, with 1inch square copper pad layout .
7. Guaranteed by design, not subject to production.

Typical Characteristics(N-Channel)

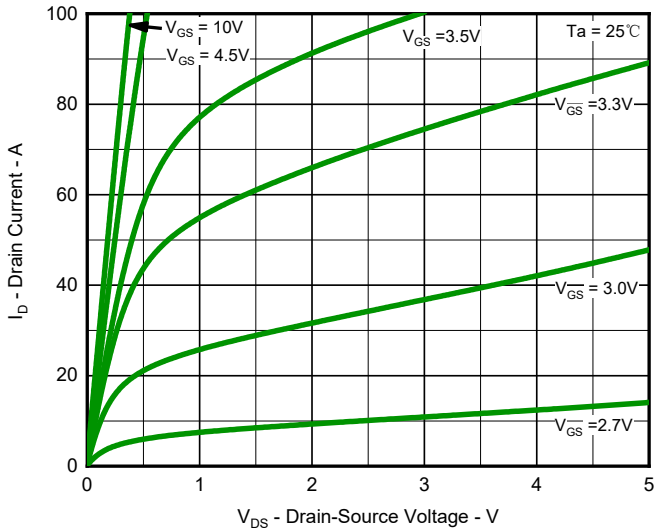


Fig.1 Output Characteristics

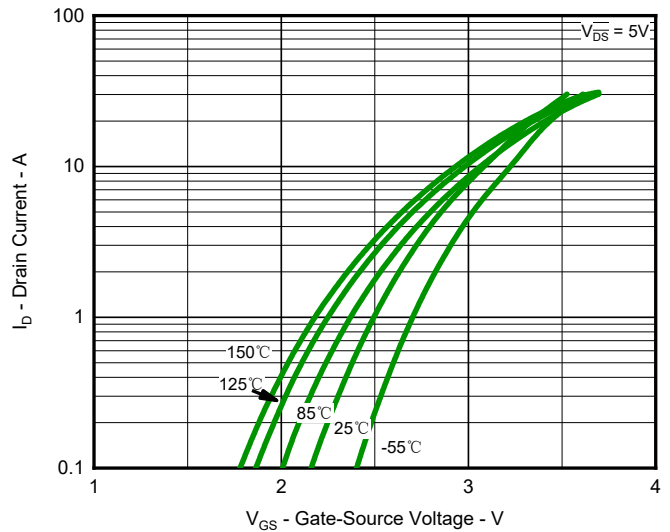


Fig.2 Typical Transfer Characteristic

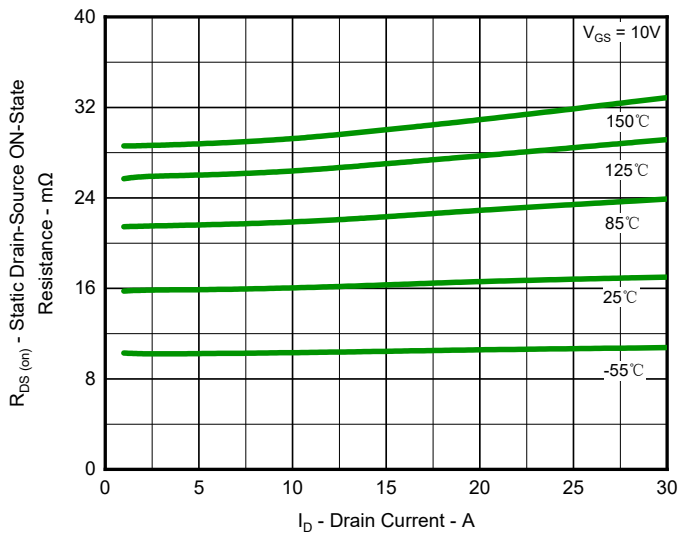


Fig.3 Typical On-Resistance vs Drain Current and Temperature

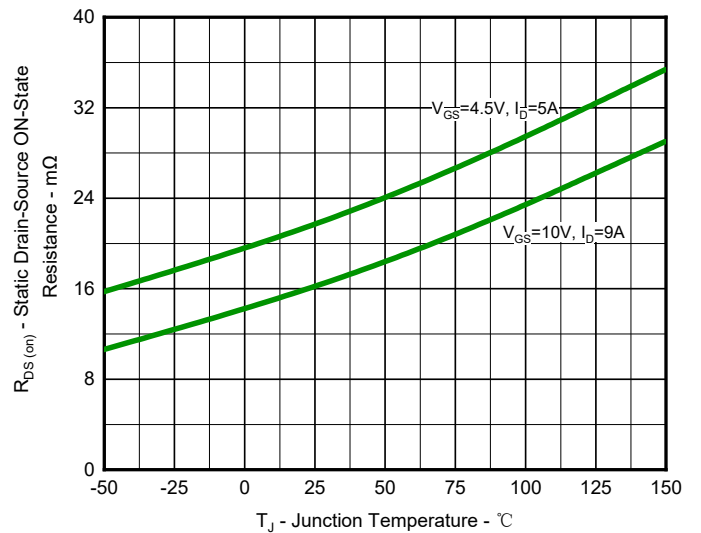


Fig.4 On-Resistance Variation with Temperature

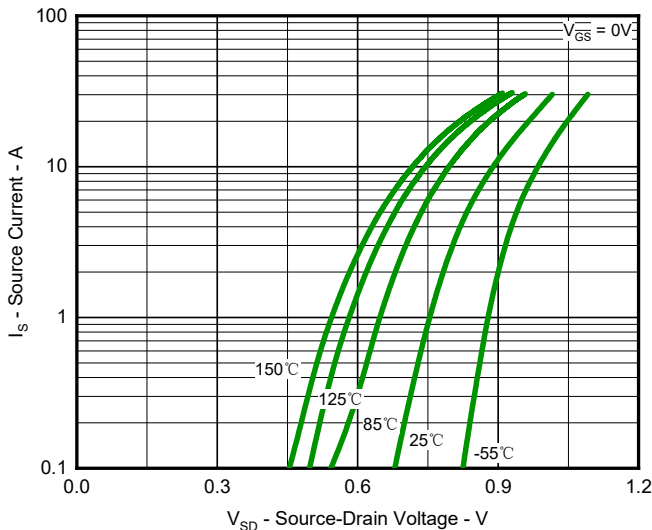


Fig.5 Diode Forward Voltage vs. Current

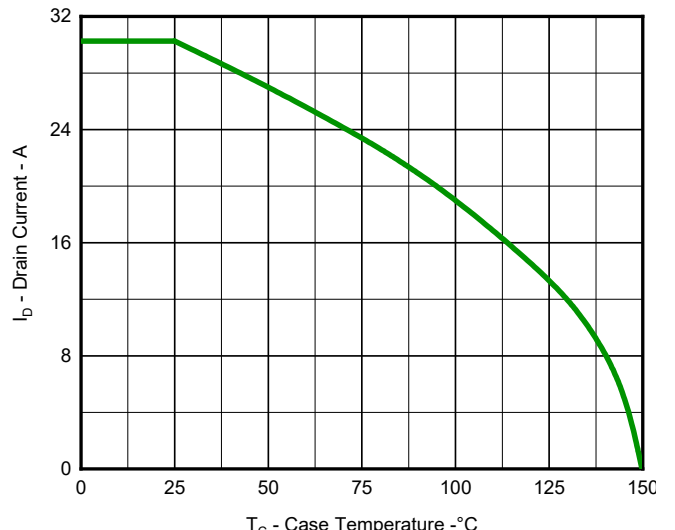


Fig.6 Maximum Drain Current vs. Case Temperature

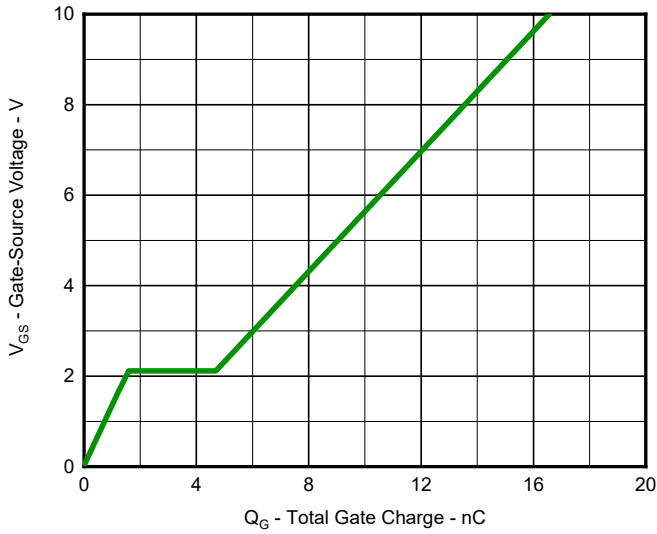


Fig.7 Gate Charge Characteristics

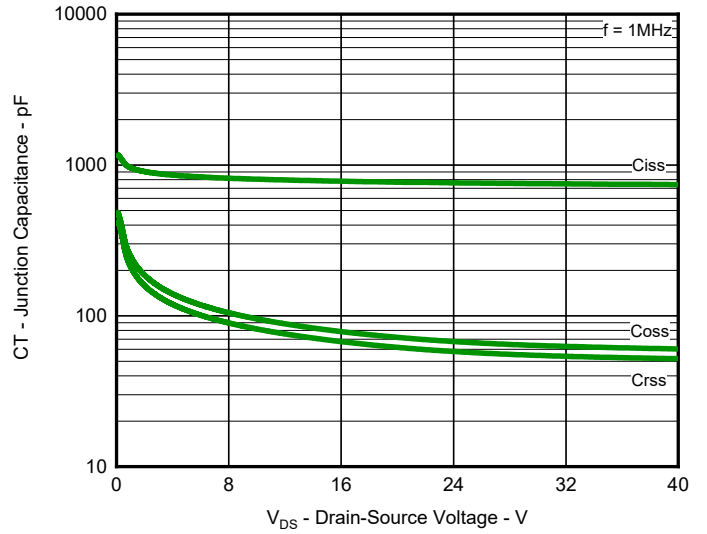


Fig.8 Typical Junction Capacitance

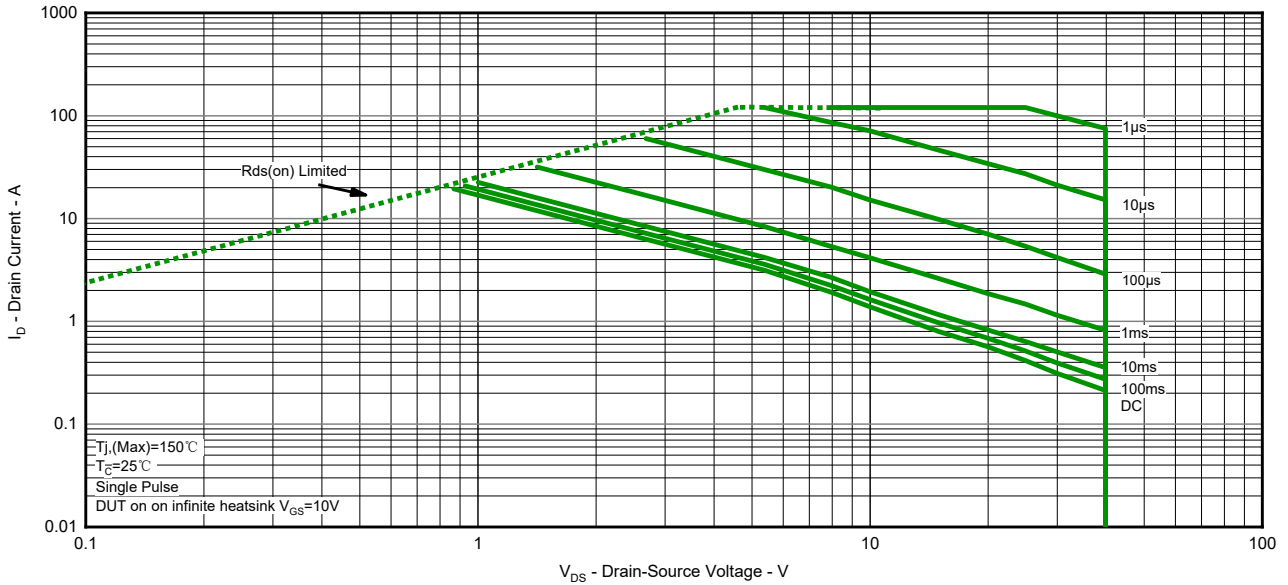


Fig.9 Safe Operation Area

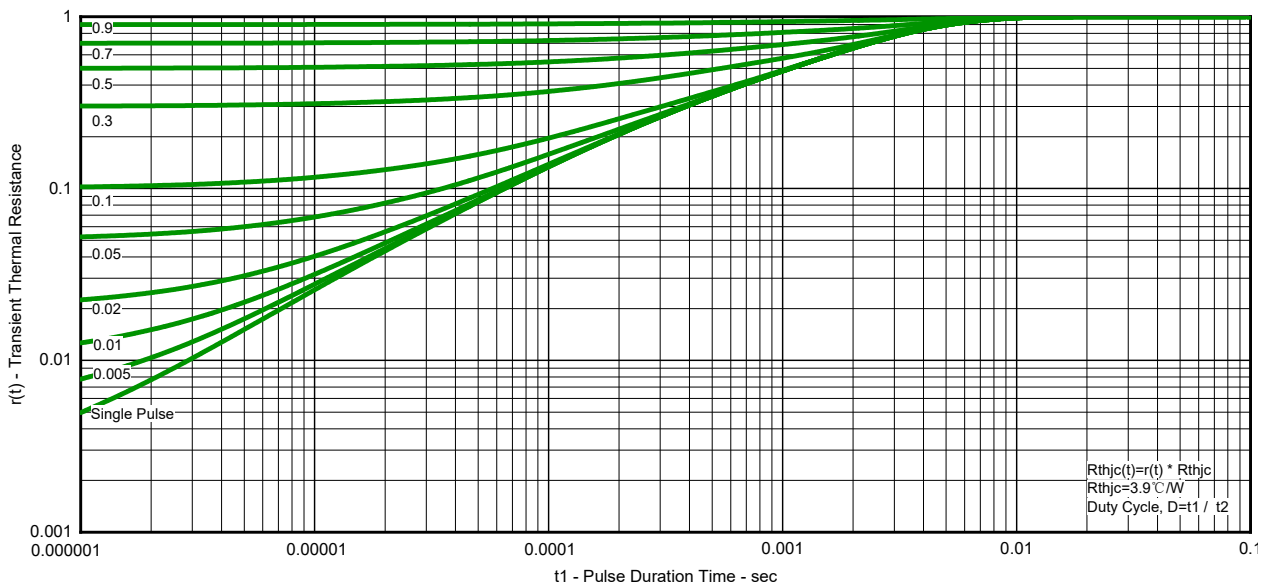


Fig.10 Transient Thermal Resistance

Typical Characteristics(P-Channel)

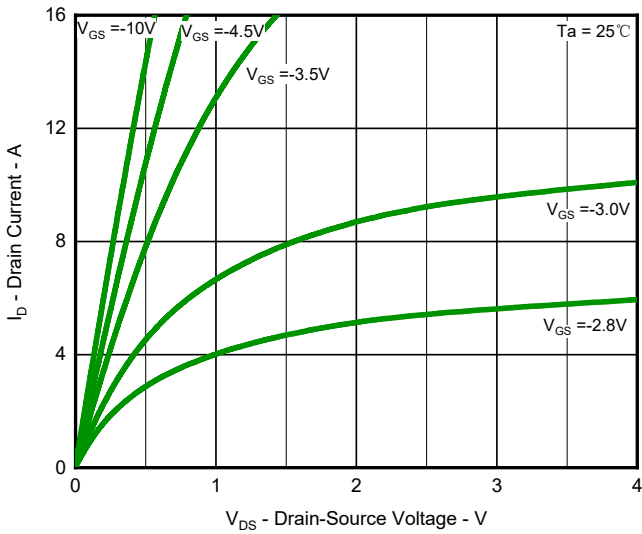


Fig.1 Output Characteristics

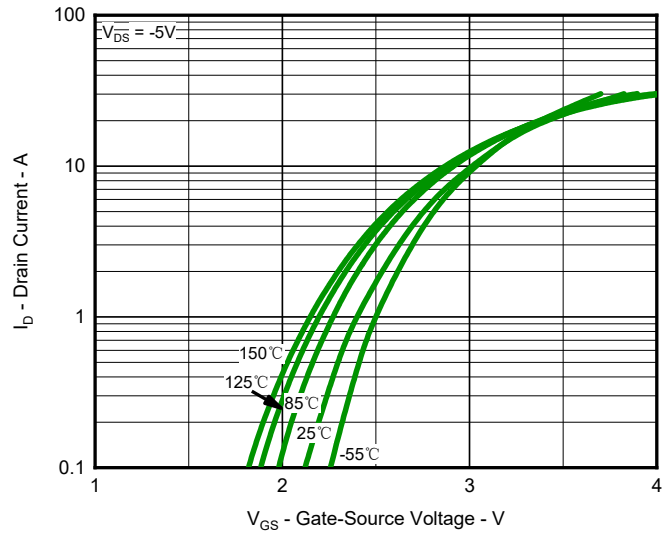


Fig.2 Typical Transfer Characteristic

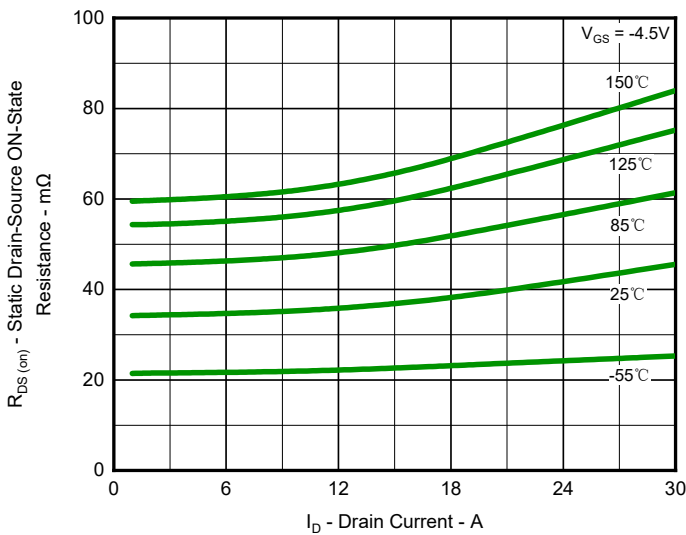


Fig.3 Typical On-Resistance vs Drain Current and Temperature

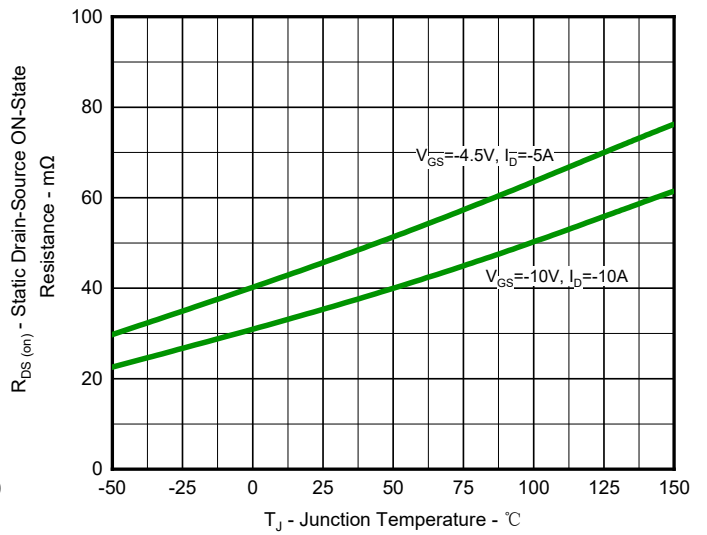


Fig.4 On-Resistance Variation with Temperature

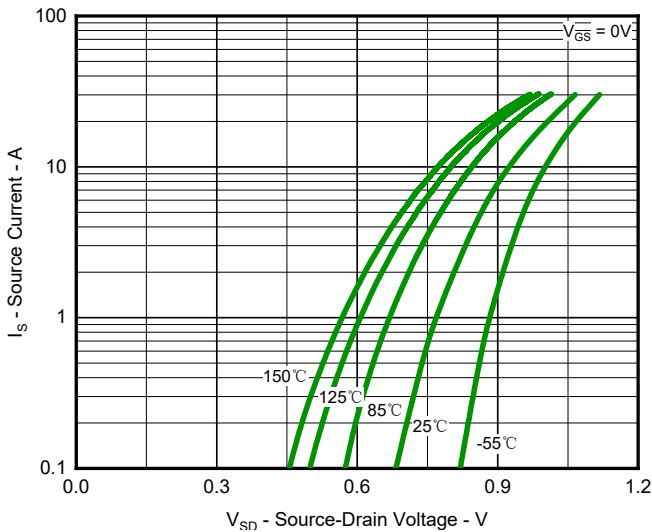


Fig.5 Diode Forward Voltage vs. Current

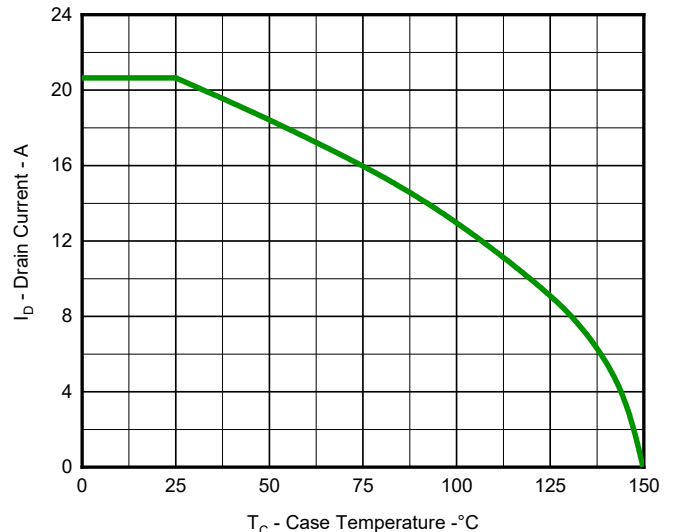


Fig.6 Maximum Drain Current vs. Case Temperature

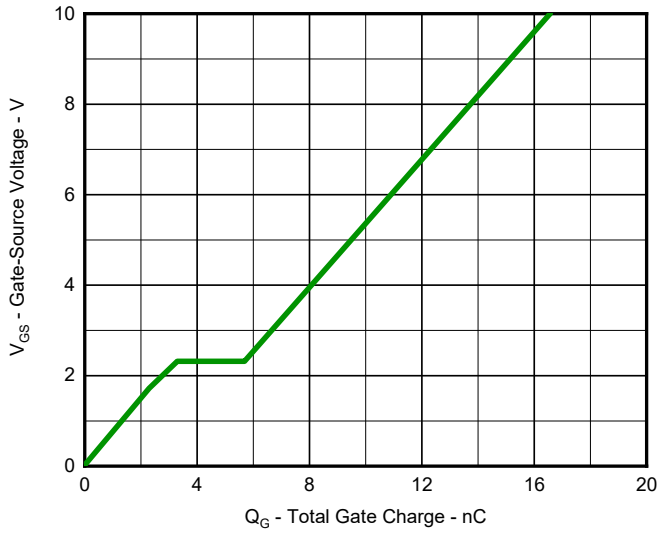


Fig.7 Gate Charge Characteristics

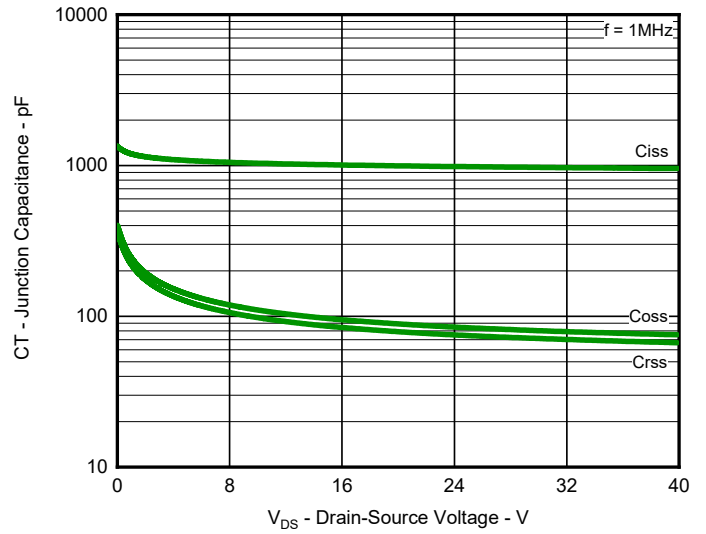


Fig.8 Typical Junction Capacitance

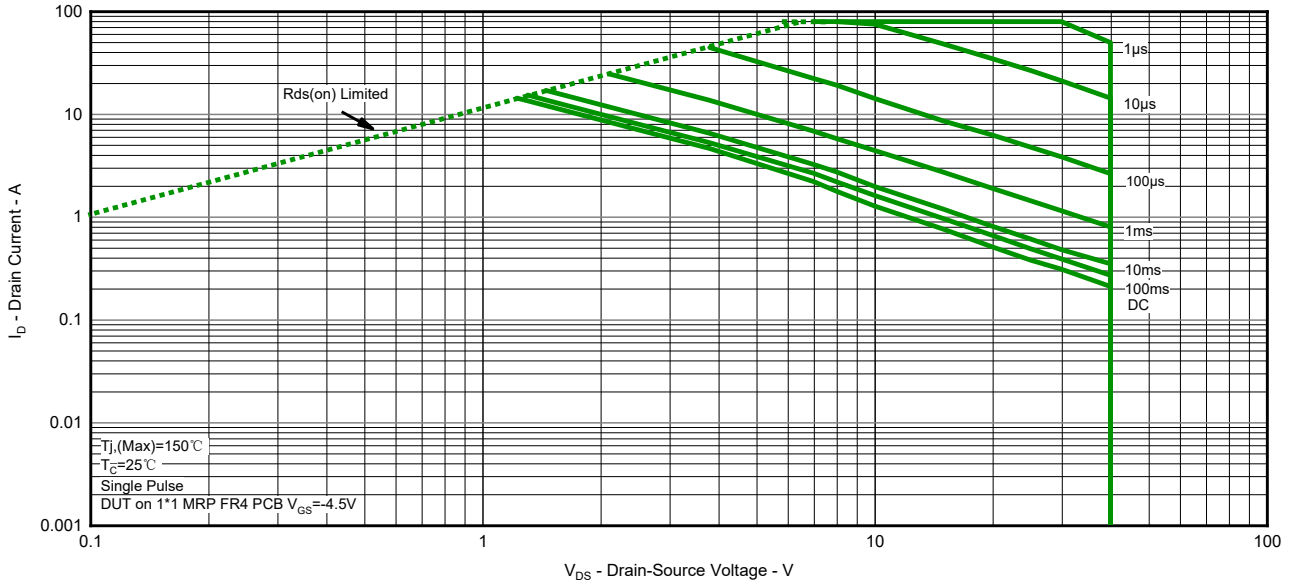


Fig.9 Safe Operation Area

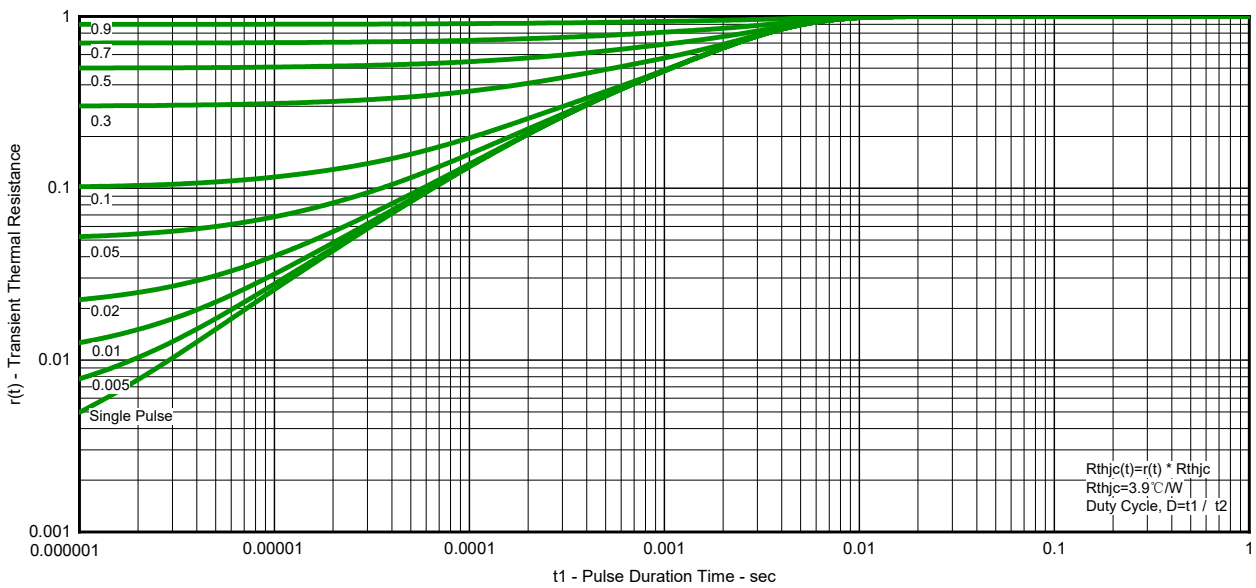
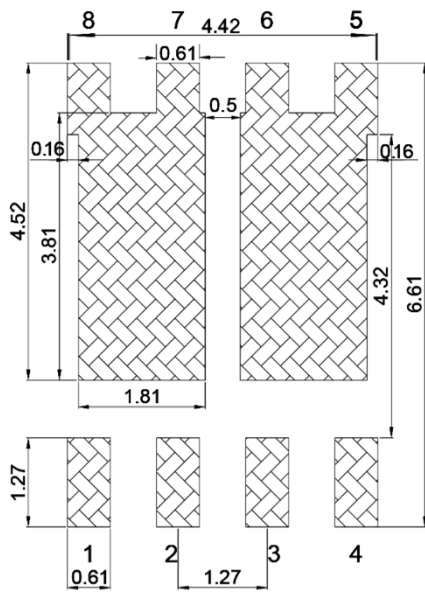
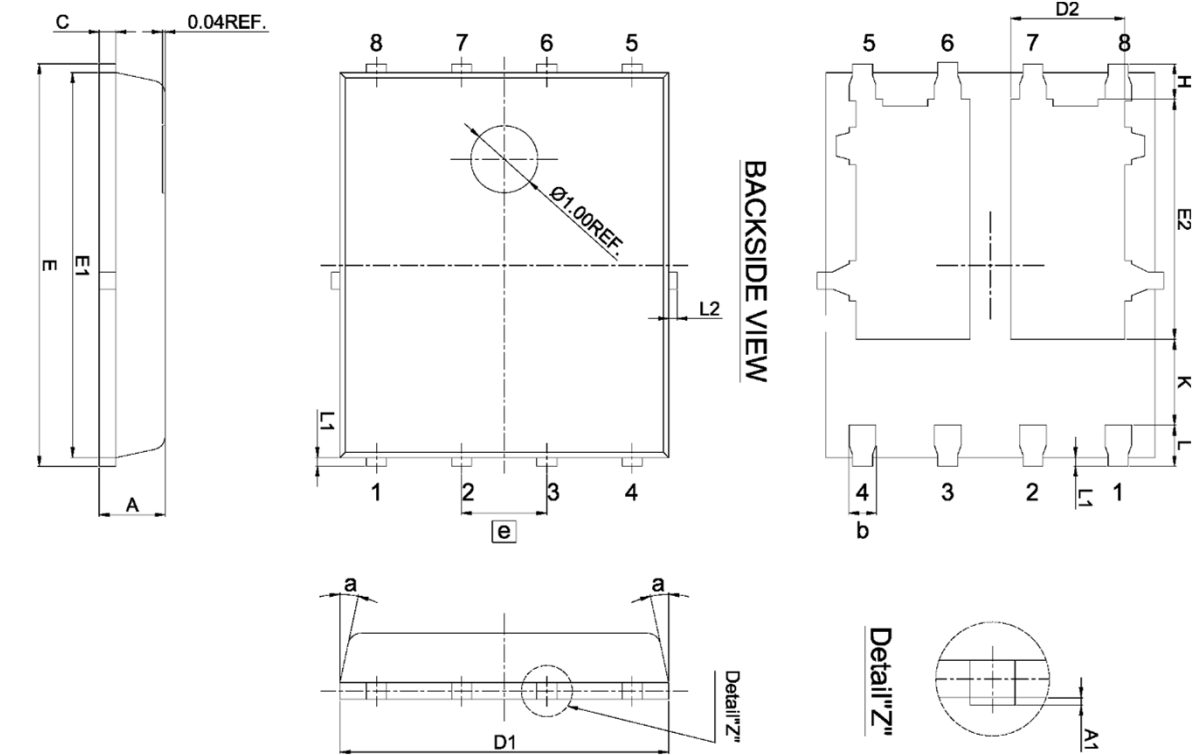


Fig.10 Transient Thermal Resistance

Product Dimension (PDFN5060-8L)



Suggested PCB Layout

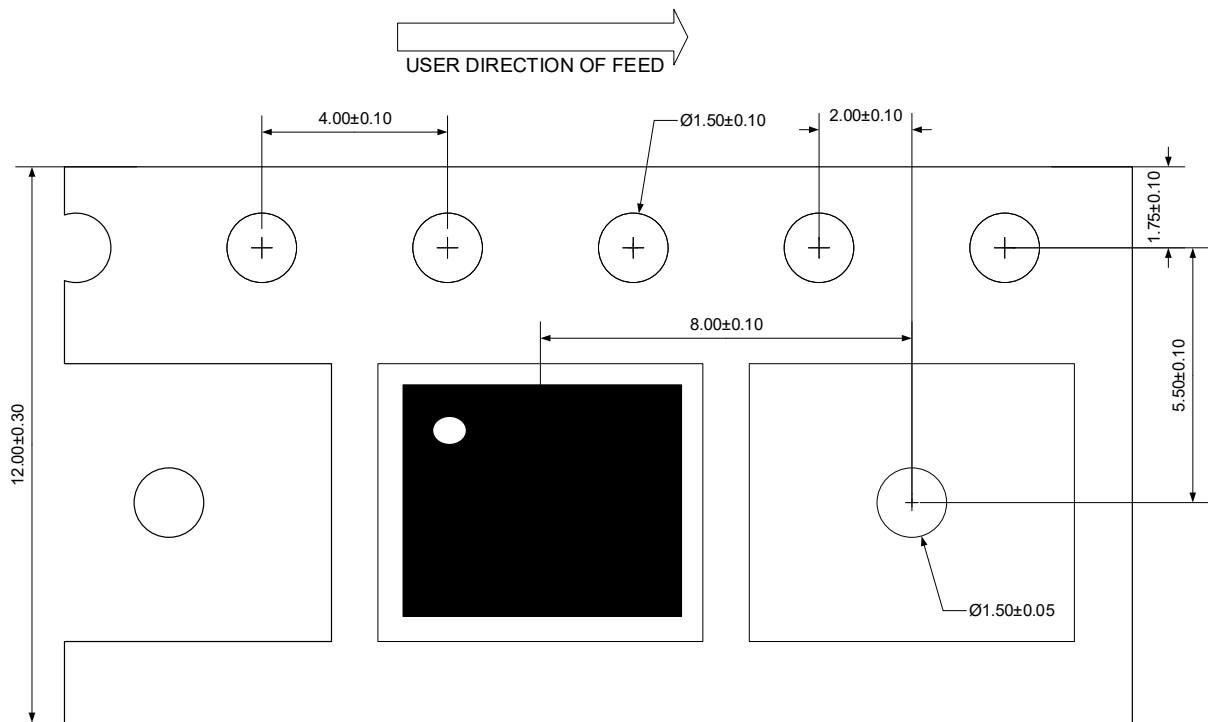
Unit: mm

Dim	Millimeters		Inches	
	Min	Max	Min	Max
A	0.90	1.10	0.035	0.043
A1	0.00	0.05	0.000	0.002
b	0.33	0.51	0.013	0.020
C	0.20	0.30	0.008	0.012
D1	4.80	5.00	0.189	0.197
D2	1.50	1.85	0.059	0.073
E	5.90	6.10	0.232	0.240
E1	5.70	5.80	0.224	0.228
E2	3.38	3.78	0.133	0.149
e	1.27 BSC.		0.050 BSC.	
H	0.43	0.63	0.017	0.025
K	1.10	-	0.043	-
L	0.51	0.71	0.020	0.028
L1	0.06	0.20	0.002	0.008
L2	-	0.125	-	0.005
a	0°	12°	0°	12°

Ordering Information


Device	Package	Reel	Shipping
PDM8N04R40	PDFN5060-8L	13"	5000 / Tape & Reel

Load With Information



Unit:mm


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