



90A 40V N-CHANNEL POWER MOSFET

PDFN5060-8L(Prefix :L)

Description

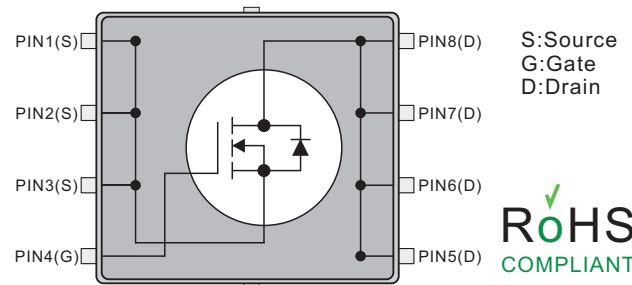
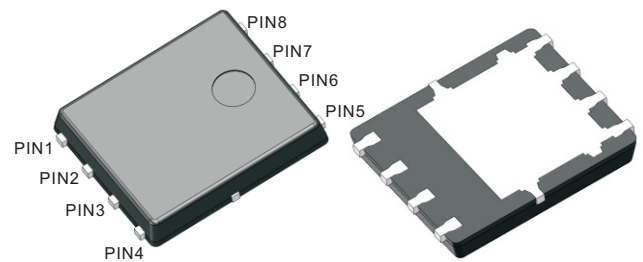
This model is an n-channel enhanced MOS power field effect transistor manufactured by silicon epitaxial process. This model has excellent switching characteristics, extremely low on impedance, low gate charge and other characteristics.

Features

- Hireliability application and automotive grade AEC-Q101 qualified
- Moisture sensitivity level 1
- $R_{DS(ON)} < 5.1m\Omega @ V_{GS}=10V, I_D=20A$
- Extremely low on impedance
- Low gate charge
- Superior switching characteristics
- 100% Avalanche tested
- 100% ΔV_{DS} tested

Mechanical data

- Case: PDFN5060-8L
- Approx. Weight:0.093g (0.0032oz)
- RoHS compliant
- Case Material: “Green” molding compound, UL flammability classification 94V-0,“Halogen-free”.



Absolute Maximum Ratings (Ta=25°C, Unless Otherwise Specified)

Parameter	Symbols	Ratings	Units
Drain-Source Voltage	V_{DSS}	40	V
Gate-Source Voltage	V_{GSS}	± 20	V
Continuous Drain Current $V_{GS}=10V, T_c=25^\circ C$	I_D	90	A
Pulsed Drain Current $T_c=25^\circ C$	I_{DM}	361	A
Avalanche energy, single pulse(Note1)	E_{AS}	96	mJ
Power dissipation $T_c=25^\circ C$	P_{tot}	75	W
Operating junction and storage temperature	T_j, T_{stg}	-55 ~ +175	°C

Thermal Characteristics

Parameter	Symbols	Ratings	Units
Device on PCB cooling area (Note2)	R_{thJA}	67	°C/W
Thermal resistance, junction - case	R_{thJC}	2.3	°C/W

NOTE:

- 1.L=0.5mH, $V_{DD} = 50V$, $R_G = 25\Omega$, Starting $T_J = 25^\circ C$
- 2.Device on 40 mm x 40 mm x 1.5 mm epoxy PCB FR-4 with 6 cm² (one layer, 70 μm thick) copper area for drain connection. PCB is vertical in still air.



Electrical Characteristics (Ta=25°C, Unless Otherwise Specified)

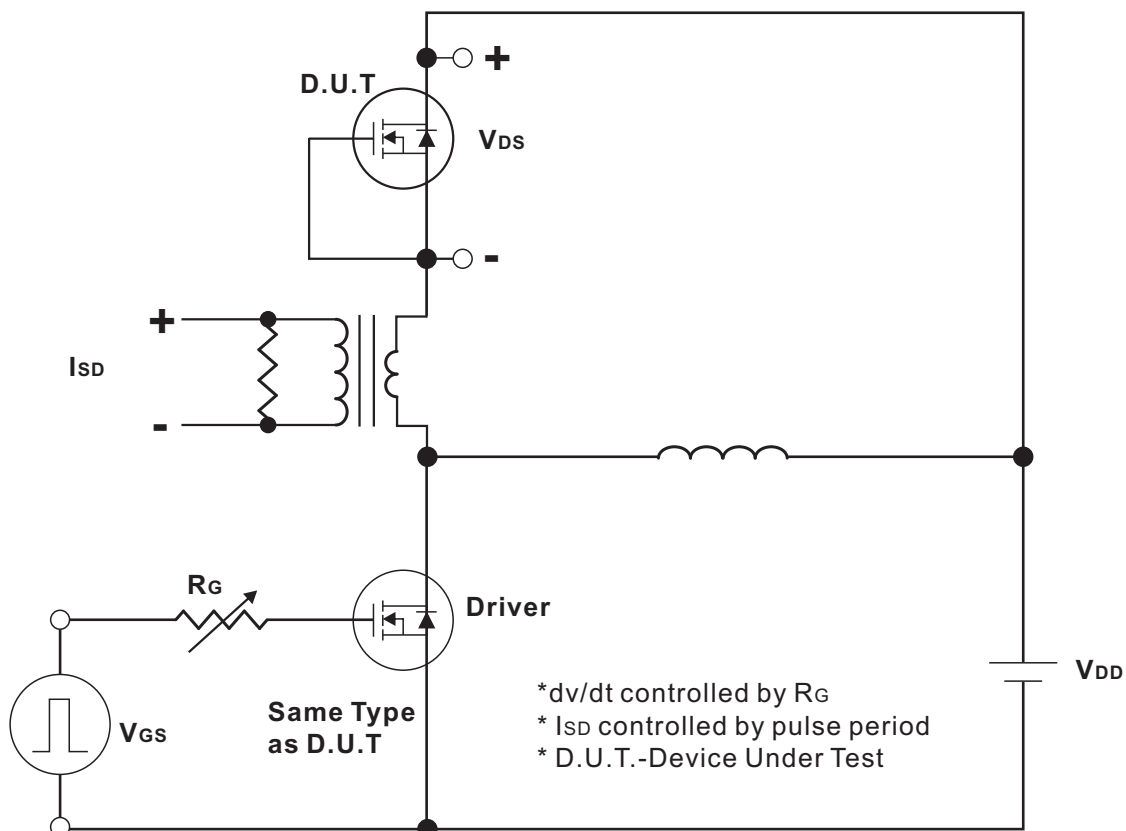
Parameter	Symbols	Test Conditions	Min	Typ	Max	Units
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	40			V
Drain-Source Leakage Current	I_{DSS}	$V_{DS}=40V, V_{GS}=0V$			1.0	μA
Gate- Source Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$			100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	2.0		4.0	V
Static Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=20A$		4.1	5.1	$m\Omega$
Transconductance	g_{fs}	$V_{DS}=5V, I_D=20A$		30		S
Dynamic Characteristics						
Input Capacitance	C_{ISS}	$V_{DS}=20V,$		1027		pF
Output Capacitance	C_{OSS}	$V_{GS}=0V,$		662		pF
Reverse Transfer Capacitance	C_{RSS}	$f=1.0MHz$		105		pF
Gate Resistance	R_g			2.5		Ω
Switching Characteristics						
Total Gate Charge (Note 1)	Q_G	$V_{DS}=20V, V_{GS}=10V,$		14.9		nC
Gate-Source Charge	Q_{GS}	$I_D=20A(NOTE1,2)$		5.0		nC
Gate-Drain Charge	Q_{GD}			3.0		nC
Turn-On Delay Time (Note 1)	$t_{D(ON)}$	$V_{DS}=20V, V_{GS}=10V,$		8.5		ns
Turn-On Rise Time	t_R	$R_G=6\Omega, I_D=20A$		29.8		ns
Turn-Off Delay Time	$t_{D(OFF)}$	(NOTE1,2)		16.2		ns
Turn-Off Fall Time	t_F			6.7		ns
Drain-source Diode Characteristics And Maximum Ratings Description						
Drain-Source Diode Forward Voltage (Note 1)	V_{SD}	$I_{SD}=1A, V_{GS}=0V$			1.0	V
Diode continuous forward current	I_S	$T_C=25^\circ C$			75	A
Reverse Recovery time	t_{rr}	$V_{GS}=0V, I_{SD}=20A$		24		ns
Reverse Recovery Charge	Q_{rr}	$di/dt=100A/us$		9.6		nC

Notes:

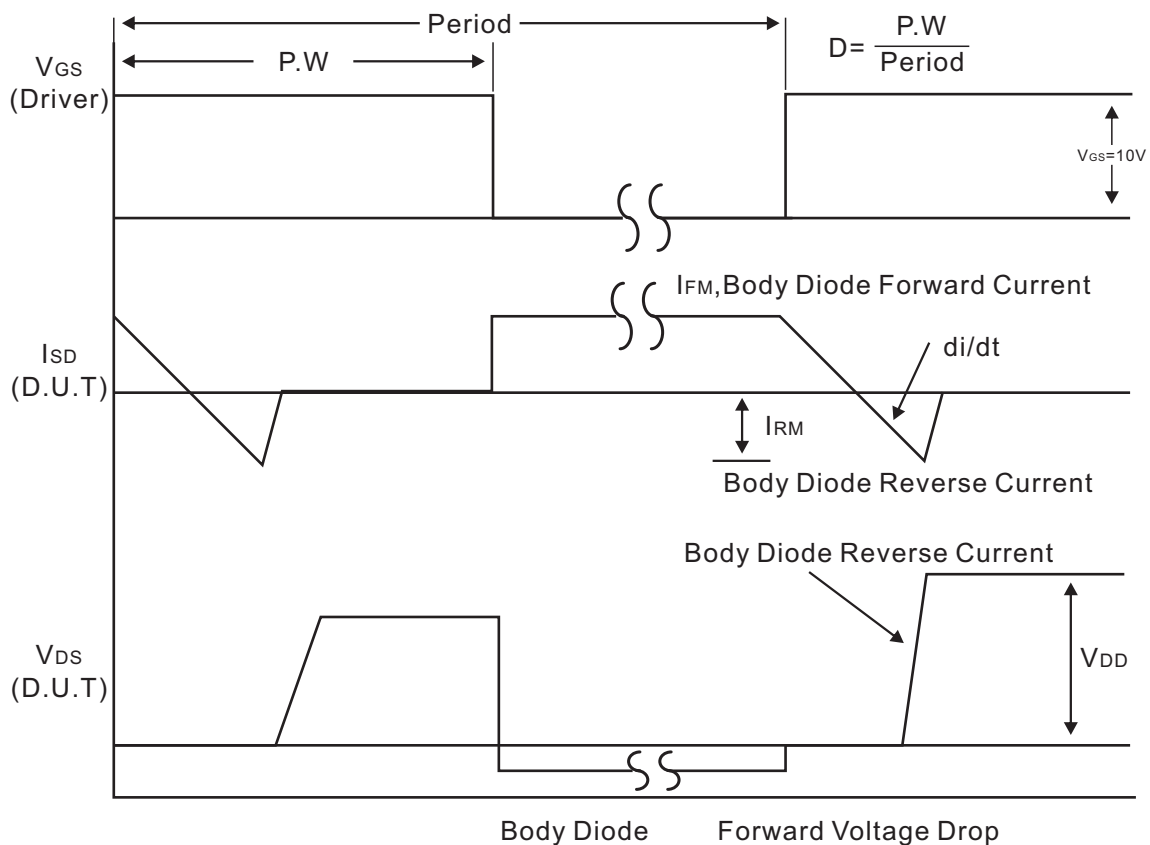
1. Pulse Test: Pulse width $\leq 300\mu s$, Duty cycle $\leq 2\%$.
2. Essentially independent of operating temperature.



Test Circuits and waveforms



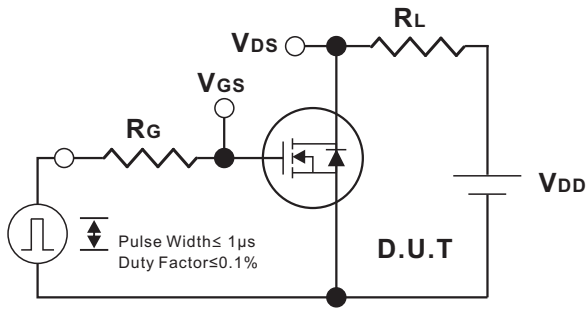
Peak Diode Recovery dv/dt Test Circuit



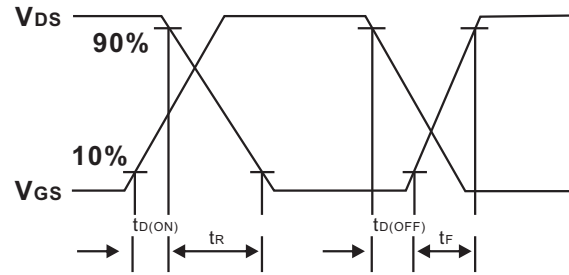
Peak Diode Recovery dv/dt Waveforms



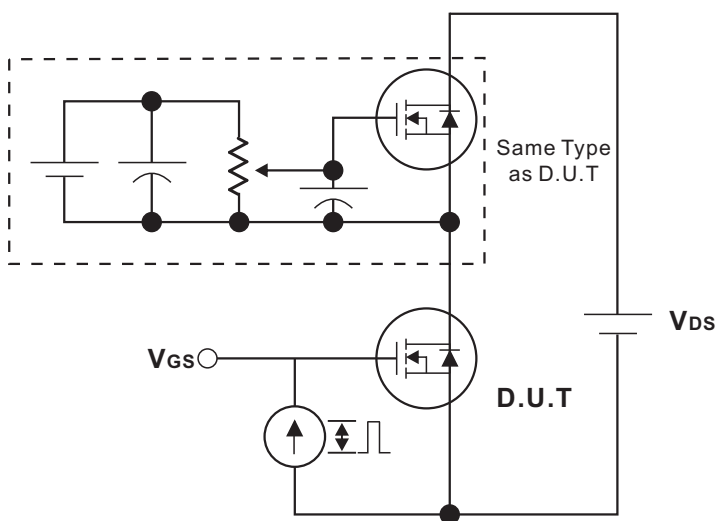
Test Circuits and waveforms



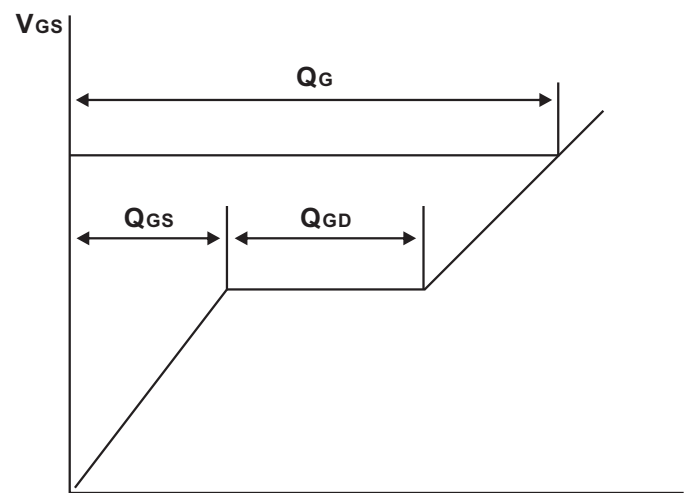
Switching Test Circuit



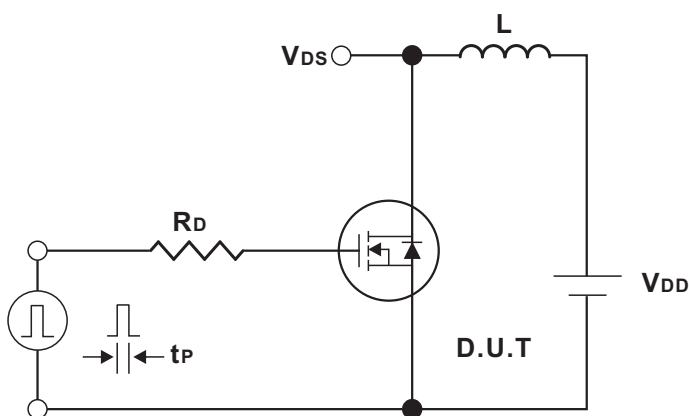
Switching Waveforms



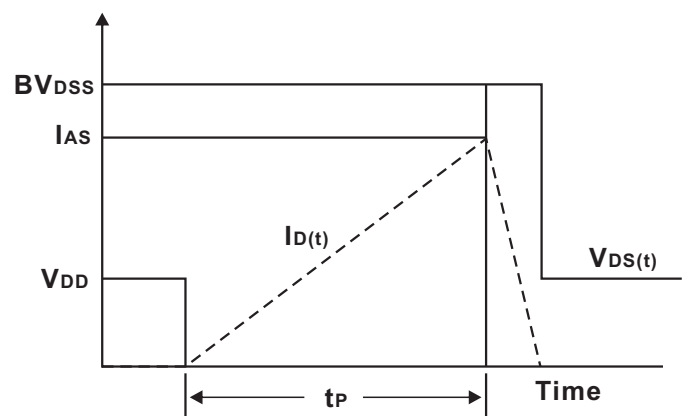
Gate Charge Test Circuit



Charge
Gate Charge Waveform



Unclamped Inductive Switching Test Circuit



Unclamped Inductive Switching Waveforms



Typical Characteristics

Fig.1 Output characteristics

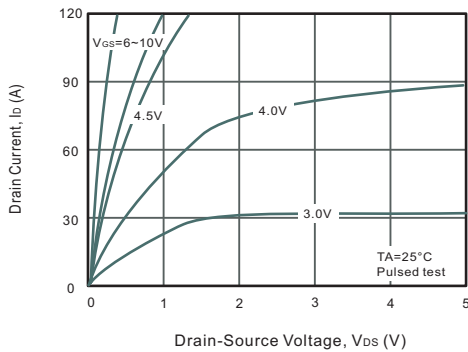


Fig.2 Power Dissipation

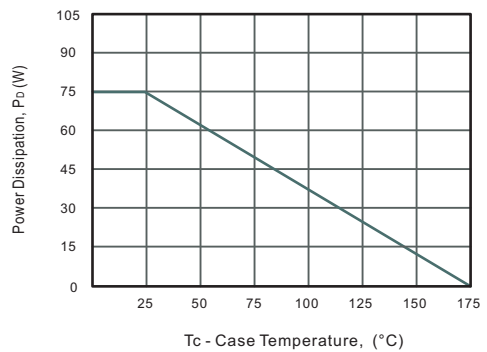


Fig.3 Drain Current Derating

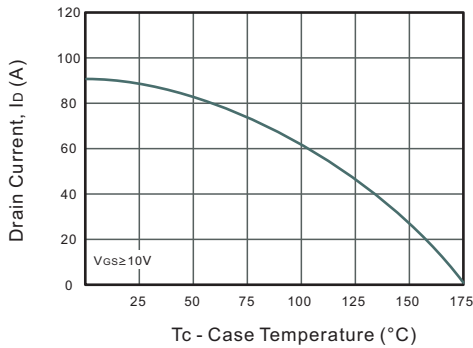


Fig.4 Drain-Source On-Resistance vs. Drain Current

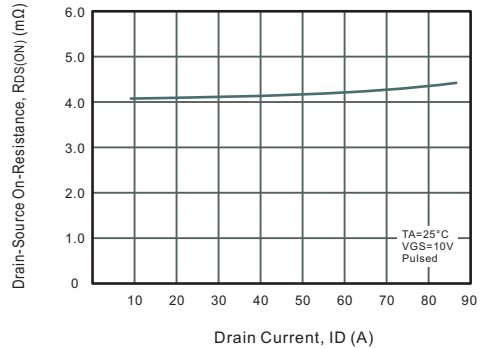


Fig.5 Gate Threshold Voltage vs. Junction Temperature

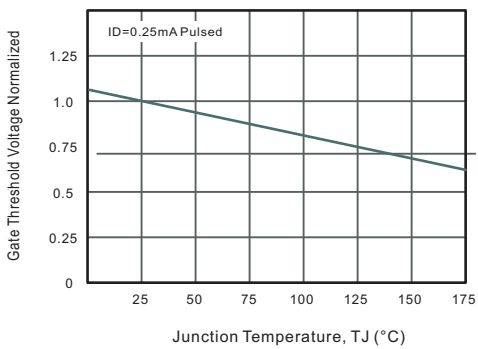


Fig.6 Body-diode Forward Characteristics

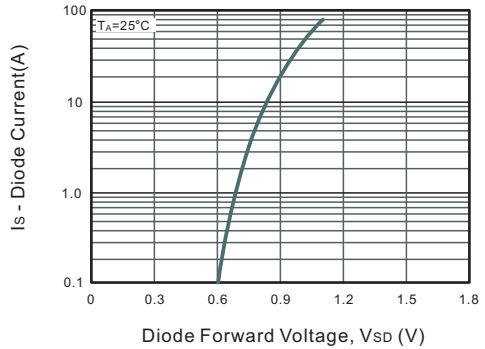


Fig.7 Drain-Source On-Resistance vs. Junction Temperature

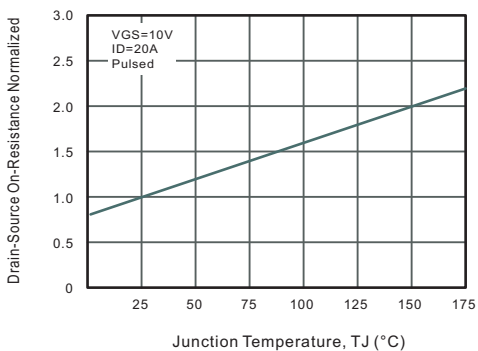
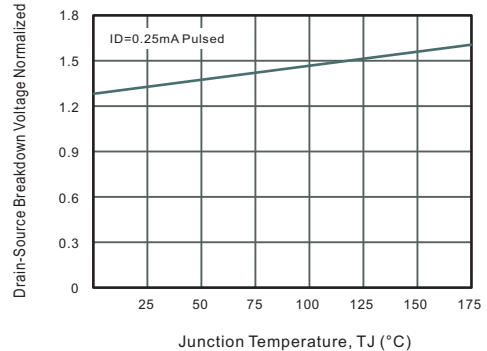


Fig.8 Breakdown Voltage vs. Junction Temperature





Typical Characteristics

Fig.9 Capacitance Characteristics

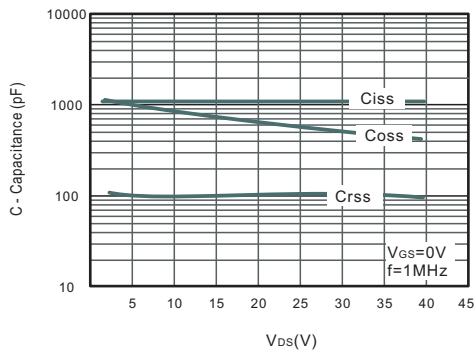


Fig.10 Gate Charge Characteristics

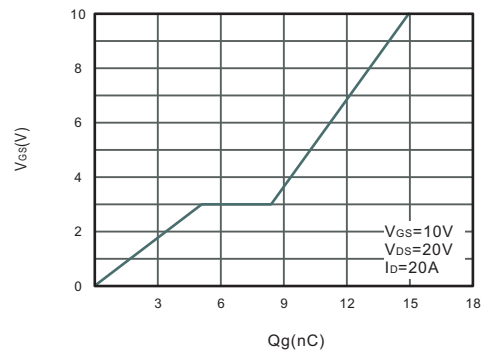


Fig.11 Safe Operating Area

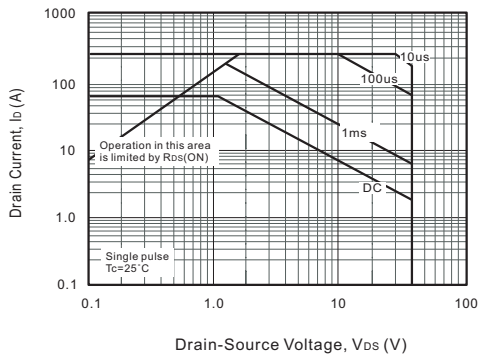
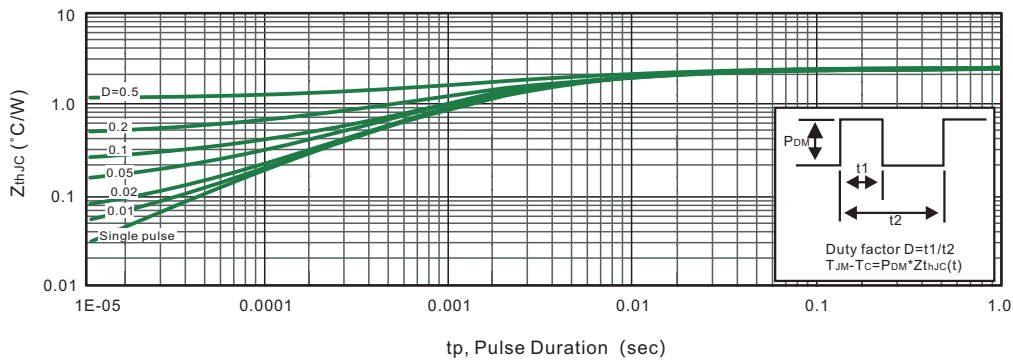


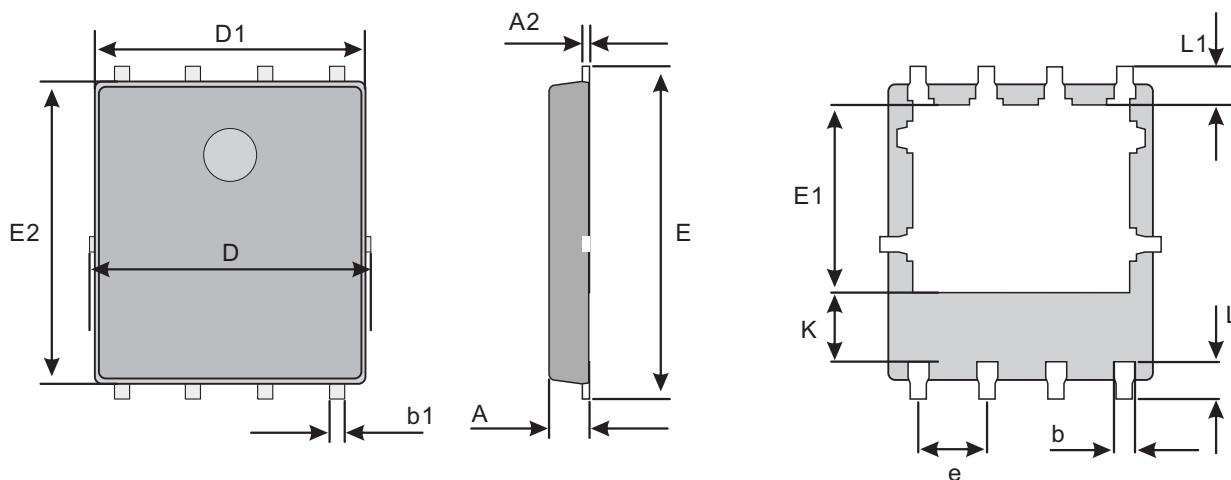
Fig.12 Max. Transient Thermal Impedance





Package Outline
Plastic surface mounted package;8 leads

PDFN5060-8L



Mechanical data

UNIT		A	A2	b	b1	D	D1	E	E1	E2	e	K	L	L1
mm	max	1.1	0.304	0.4 ref.	0.4	5.3	5.24	6.35	3.675	6.09	1.27 typ.	1.29 typ.	0.785	0.7 typ.
	typ	1.0	0.254		0.3	5.15	5.04	6.15	3.475	5.89			0.685	
	min	0.9	0.204		0.2	5.0	4.84	5.95	3.275	5.69			0.585	
mil	max	43	12	16 ref.	16	209	206	250	145	240	50 typ.	51 typ.	31	28 typ.
	typ	39	10		12	203	198	242	137	232			27	
	min	35	8		8	197	191	234	129	224			23	

Marking

Type number	Marking code
L4R1N40HXR	L4R1N40HXR



Important Notice and Disclaimer

Jingdao Microelectronics reserves the right to make changes to this document and its products and specifications at any without notice.

Customers should obtain and confirm the latest product information and specifications before final, purchase or use.

Jingdao Microelectronics makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, not does Jingdao Microelectronics assume any liability for application assistance or customer product design.

Jingdao Microelectronics does not warrant or accept any liability with products which are purchased or used for any unintended or unauthorized application.

No license is granted by implication or otherwise under any intellectual property rights of Jingdao Microelectronics.

Jingdao Microelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of Jingdao Microelectronics.