



AMDU040N013PSVRH

Single N-channel Trench MOSFET 40V 1.3mΩ

FEATURES

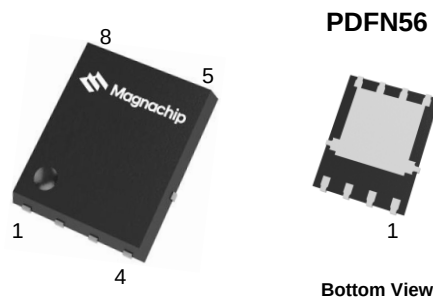
- Trench power MOSFET technology
- Single N-channel trench, Normal gate level
- Enhanced avalanche ruggedness
- 100% Avalanche tested
- Maximum 175°C junction temperature

PRODUCT VALIDATION

- Qualified according to AEC-Q101 Standard

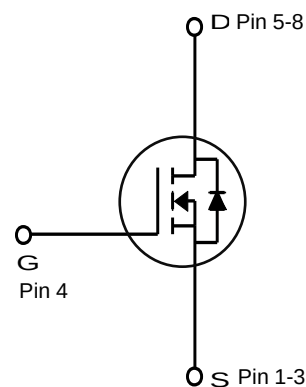
KEY PERFORMANCE PARAMETERS

V_{DS}	40	V
$R_{DS(on), typ.}$	0.00112	Ω
I_D	228	A
Q_g	50	nC
Junction temperature _{, max}	175	°C



Top View

Bottom View



RoHS Compliant
HALOGEN-FREE



ORDERING INFORMATION

Type / Ordering Code	Package	Marking	Packing	RoHS Status
AMDU040N013PSVRH	PDFN56	040N013P	Tape & Reel	Halogen Free

<http://www.magnachip.com>

ABSOLUTE MAXIMUM RATINGS, at $T_C = 25^\circ\text{C}$, unless otherwise specified

Parameter		Symbol	Rating	Unit
Drain-source Voltage		V_{DS}	40	V
Gate-source Voltage		V_{GS}	± 20	
Drain current	$T_C=25^\circ\text{C}$ (Silicon Limited)	I_D	228	A
	$T_C=25^\circ\text{C}$ (Package Limited)		135	
	$T_C=100^\circ\text{C}$ (Silicon Limited)		161	
¹⁾ Pulsed drain current	$T_C=25^\circ\text{C}$, $t_p \leq 100 \mu\text{s}$	I_{DM}	909	
Total power dissipation	$T_C=25^\circ\text{C}$	P_{tot}	115	W
	$T_C=100^\circ\text{C}$		58	
²⁾ Avalanche energy, single pulse		E_{AS}	294	mJ
Operating and storage temperature		T_J, T_{stg}	- 55 ~ 175	$^\circ\text{C}$

THERMAL CHARACTERISTICS

Parameter	Symbol	Rating	Unit
Thermal resistance, junction - case	$R_{\theta JC}$	1.3	$^\circ\text{C/W}$
³⁾ Thermal resistance, junction - ambient	$R_{\theta JA}$	50	

ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$)**STATIC CHARACTERISTICS**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Drain-source breakdown voltage	$V_{(BR)DSS}$	40	-	-	V	$V_{GS}=0\text{ V}$, $I_D=250\text{ }\mu\text{A}$
Gate threshold voltage	$V_{GS(th)}$	2.25	-	3.75		$V_{DS}=V_{GS}$, $I_D=303\text{ }\mu\text{A}$
Zero gate voltage drain current	I_{DSS}	-	-	1	μA	$V_{DS}=40\text{ V}$, $V_{GS}=0\text{ V}$
Gate-source leakage current	I_{GSS}	-	-	± 100	nA	$V_{GS}=\pm 20\text{ V}$, $V_{DS}=0\text{ V}$
Drain-source on-state resistance	$R_{DS(on)}$	-	1.12	1.30	m Ω	$V_{GS}=10\text{ V}$, $I_D=50\text{ A}$
		-	1.21	1.86		$V_{GS}=8\text{ V}$, $I_D=50\text{ A}$
⁴⁾ Gate resistance	R_g	-	1.1	-	Ω	$f=1\text{ MHz}$
⁴⁾ Transconductance	g_{fs}	-	103	-	S	$V_{DS}=10\text{ V}$, $I_D=50\text{ A}$

⁴⁾ DYNAMIC CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Input capacitance	C_{iss}	-	4065	-	pF	$V_{GS}=0\text{ V}$, $V_{DS}=20\text{ V}$, $f=1\text{ MHz}$
Output capacitance	C_{oss}	-	1017	-		
Reverse transfer capacitance	C_{rss}	-	42	-		
Turn-on delay time	$t_{d(on)}$	-	24	-	ns	$V_{DD}=20\text{ V}$, $V_{GS}=10\text{ V}$, $I_D=50\text{ A}$, $R_{G,ext}=3.0\text{ }\Omega$
Rise time	t_r	-	9	-		
Turn-off delay time	$t_{d(off)}$	-	46	-		
Fall time	t_f	-	11	-		

⁴⁾ GATE CHARGE CHARACTERISTICS

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
Gate to source charge	Q_{gs}	-	15	-	nC	$V_{DD}=32\text{ V}$, $I_D=50\text{ A}$, $V_{GS}=0\text{ to }10\text{ V}$
Gate charge at threshold	$Q_{gs(th)}$	-	11	-		
Gate to drain charge	Q_{gd}	-	11	-		
Switching charge	Q_{sw}	-	15	-		
Gate charge total	Q_g	-	50	-		
Gate plateau voltage	$V_{plateau}$	-	4.9	-	V	

SOURCE-DRAIN DIODE

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions / Note
⁴⁾ Diode continuous forward current	I_S	-	-	135	A	-
⁴⁾ Diode pulse current	$I_{S,pulse}$	-	-	909		pulsed; $t_p \leq 100\text{ }\mu\text{s}$
Diode forward voltage	V_{SD}	-	0.8	1.1	V	$V_{GS}=0\text{ V}$, $I_F=50\text{ A}$
⁴⁾ Reverse recovery time	t_{rr}	-	43	-	ns	$I_F=50\text{ A}$, $di_F/dt=100\text{ A}/\mu\text{s}$
⁴⁾ Reverse recovery charge	Q_{rr}	-	43	-	nC	

Notes

- Pulse width limited by T_{Jmax}
- Starting $T_J=25^\circ\text{C}$, $L=1\text{ mH}$, $I_{AS}=24.3$, $V_{DD}=36\text{ V}$, $V_{GS}=10\text{ V}$
- Surface mounted FR-4 board by JEDEC (jesd51-7)
- The parameter is not subject to production testing - guaranteed by design.

ELECTRICAL CHARACTERISTICS DIAGRAMS

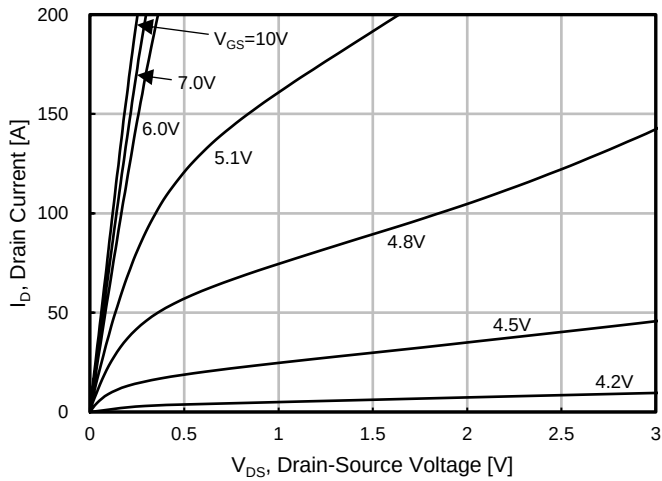


Fig. 1. Typ. Output Characteristics

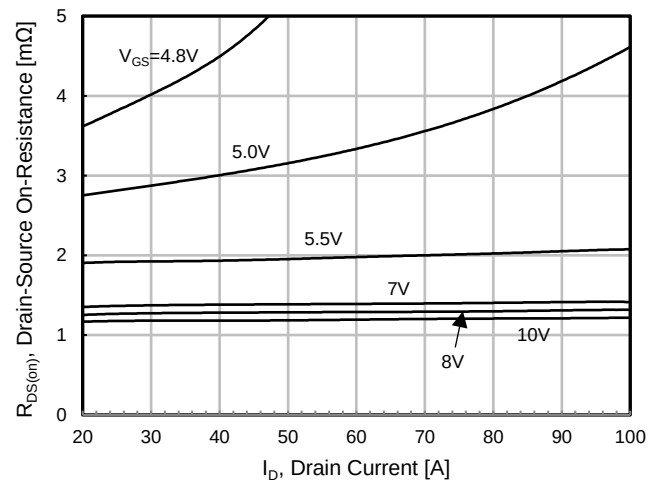


Fig. 2. Typ. Drain-Source On-Resistance

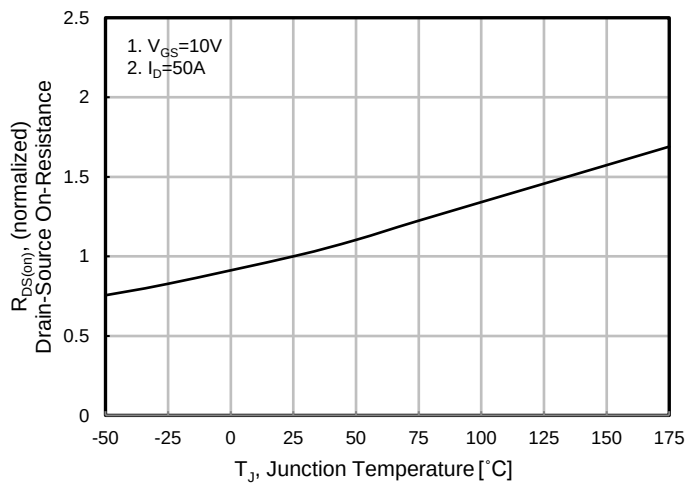


Fig. 3. On-Resistance vs. Junction Temperature

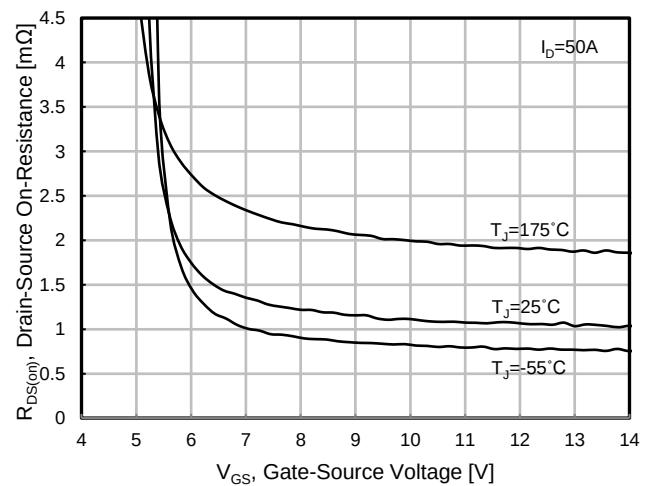


Fig. 4. On-Resistance vs. Gate-Source Voltage

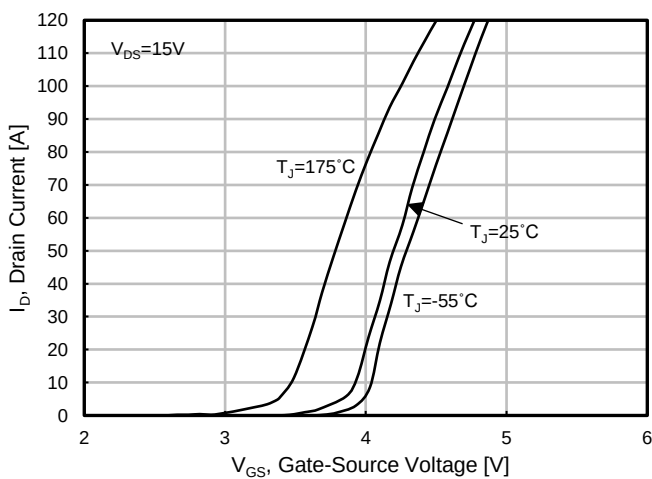


Fig. 5. Transfer Characteristics

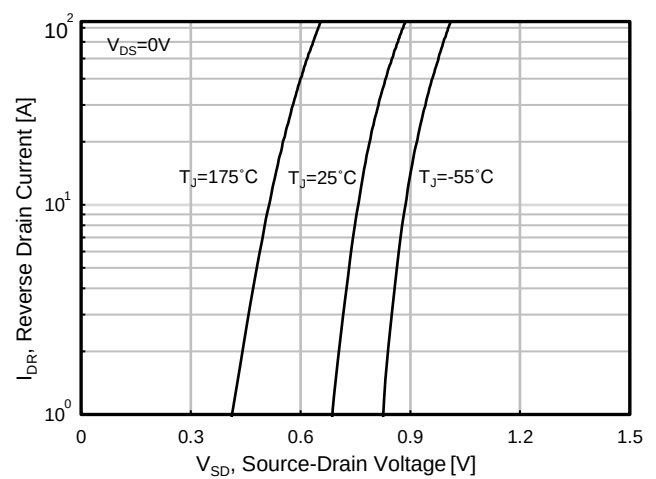
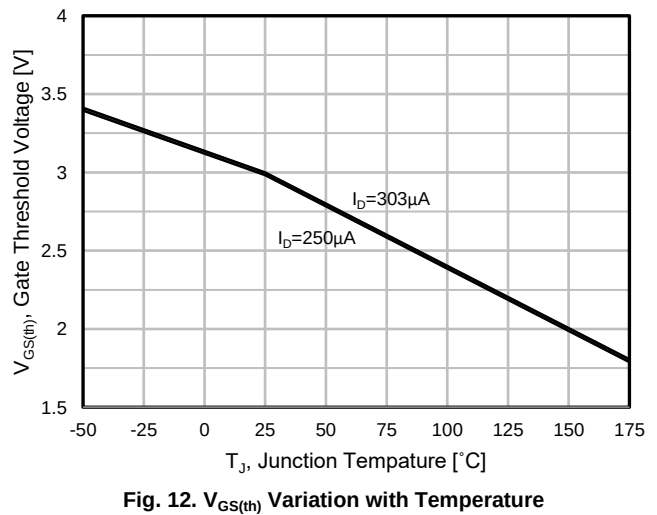
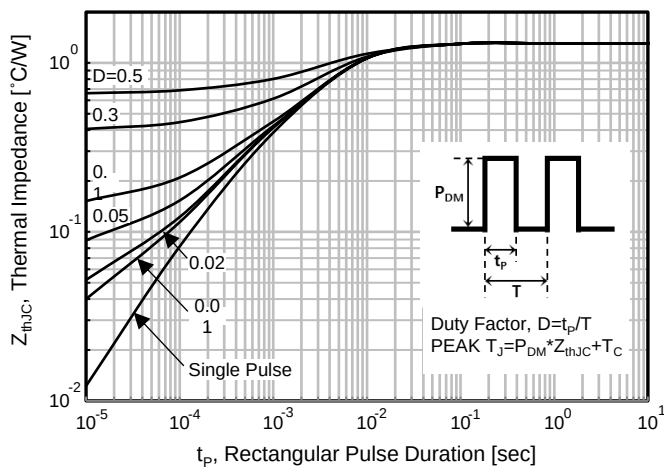
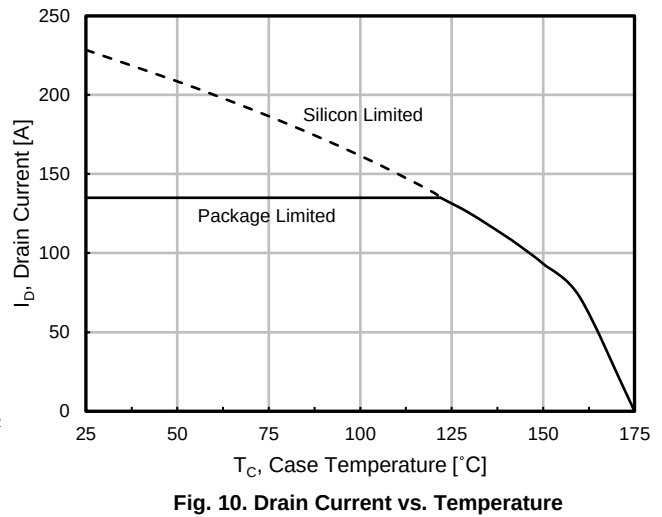
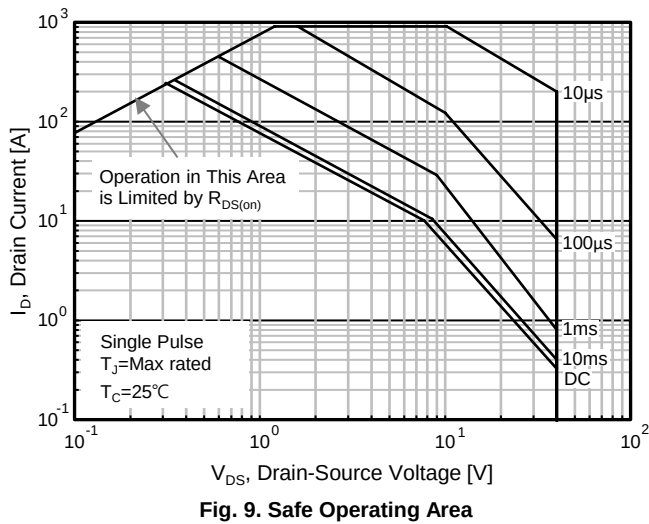
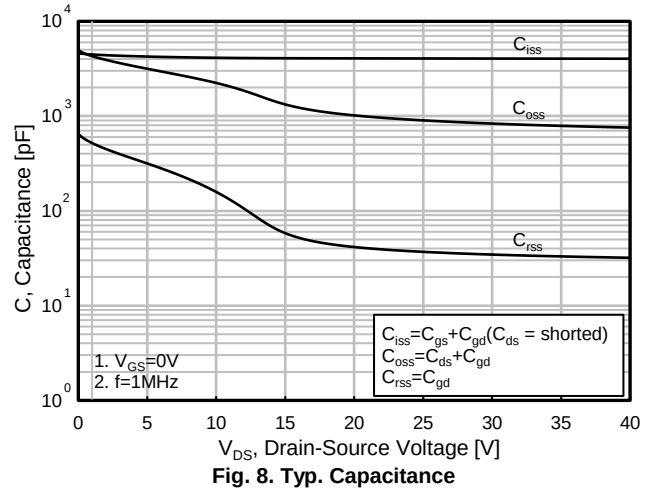
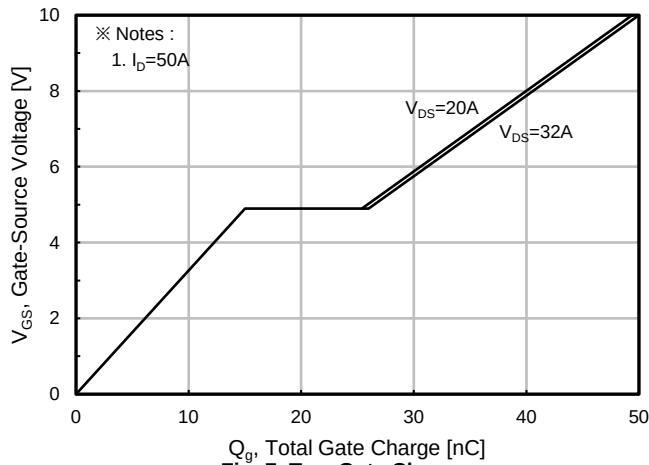


Fig. 6. Forward Characteristics of Reverse Diode

ELECTRICAL CHARACTERISTICS DIAGRAMS



ELECTRICAL CHARACTERISTICS DIAGRAMS

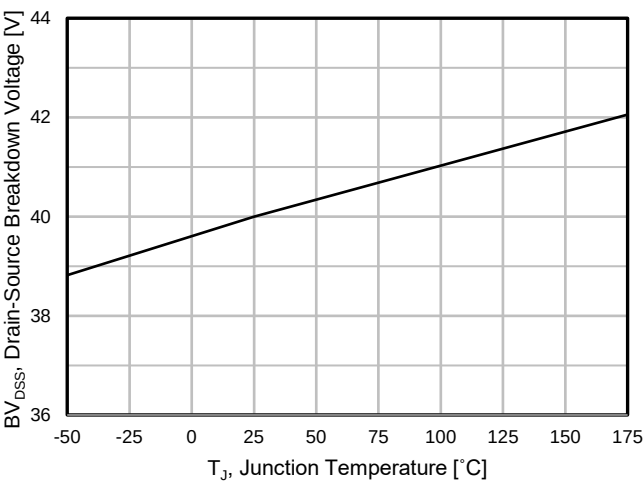


Fig. 13. BV_{DSS} Variation with Temperature

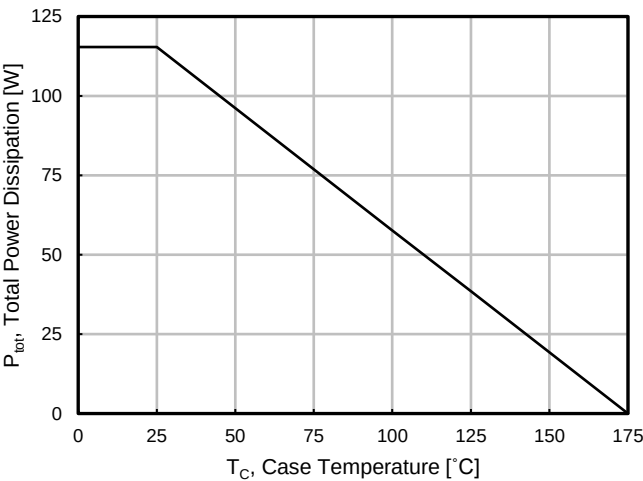
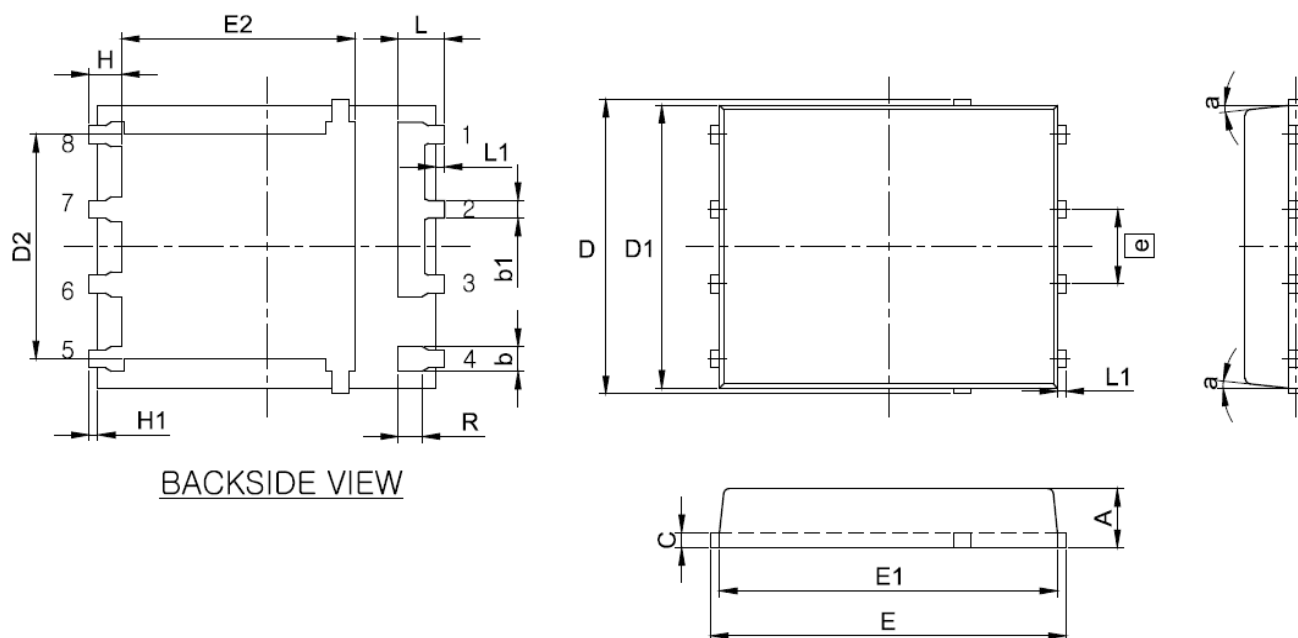


Fig. 14. Power Dissipation

Package Outlines

PDFN56



Symbol	Dimension (mm)		
	Min	Nom	Max
A	0.90	–	1.10
b	0.33	–	0.49
b1	0.26	–	1.36
C	0.20	0.25	0.34
D	4.50	5.15	5.30
D1	4.50	5.00	5.10
D2	3.65	–	3.95
E	5.90	6.15	6.30
E1	5.85	6.00	6.10
E2	3.46	–	3.86
e	1.27 BSC		
H	0.50	–	0.71
H1	0.03	–	0.13
L	0.74	–	0.84
L1	0.03	–	0.13
R	0.48	–	0.58
a	0°	–	12°

Notes

Package body size, length and width do not include mold flash, protrusions and gate burrs.

DISCLAIMER :

The Products are not designed for use in hostile environments, including, without limitation, aircraft, nuclear power generation, medical appliances, and devices or systems in which malfunction of any Product can reasonably be expected to result in a personal injury. Seller's customers using or selling Seller's products for use in such applications do so at their own risk and agree to fully defend and indemnify Seller.

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