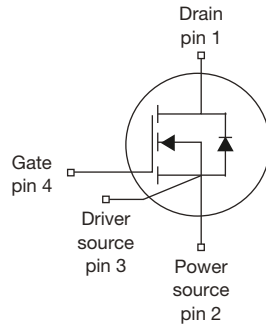
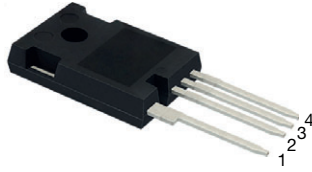


MaxSiC[®] 1200 V N-Channel SiC MOSFET

TO-247AD 4L


Marking Code: 120A080SL

FEATURES

- Fast switching speed
- Short circuit withstand time 3 μ s
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912


RoHS
 COMPLIANT
 HALOGEN
FREE
APPLICATIONS

- Solar inverters
- DC/DC converters
- Energy storage systems
- UPS (uninterruptible power supplies)

PRODUCT SUMMARY	
V_{DS} (V) at T_J max.	1200
$R_{DS(on)}$ typ. ($m\Omega$) at 25 °C	$V_{GS} = 18$ V 80
Q_g typ. (nC)	45
I_D (A)	31
C_{oss} typ. (pF)	56
P_D (W)	174
Configuration	Single

ORDERING INFORMATION	
Package	TO-247AD 4L
Lead (Pb)-free and halogen-free	MXP120A080SL-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage		V_{DS}	1200	V
Gate-source voltage		V_{GS}	-10 / +22	
Recommended operation voltage of gate-source		V_{GSOP}	-5 to -3 / +18	
Continuous drain current	$T_C = 25$ °C	I_D	31	A
Pulsed drain current ^a		I_{DM}	62	
Short-circuit withstand time ^b		T_{SC}	3	μ s
Maximum power dissipation	$T_C = 25$ °C	P_D	174	W
Operating junction and storage temperature range		T_J, T_{stg}	-55 to +175	°C
Soldering recommendations (peak temperature)	For 10 s		260	°C
Single pulse avalanche energy ^c		E_{AS}	113	mJ

Notes

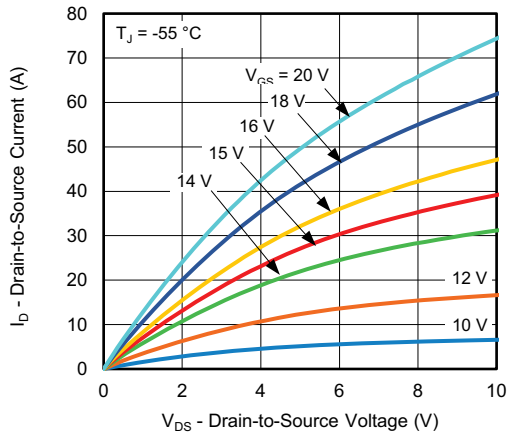
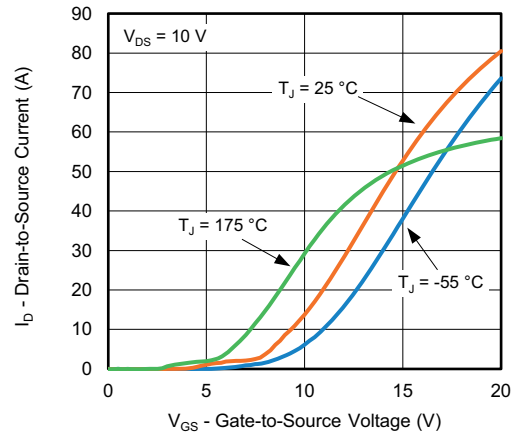
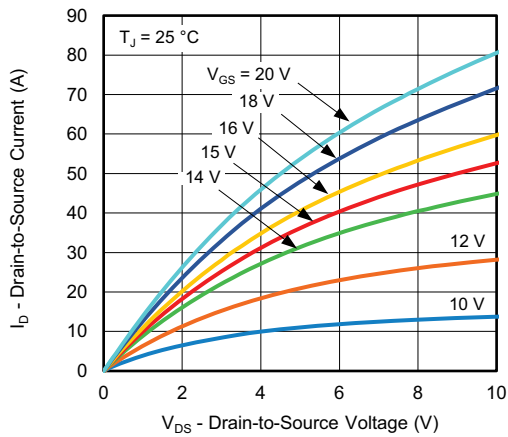
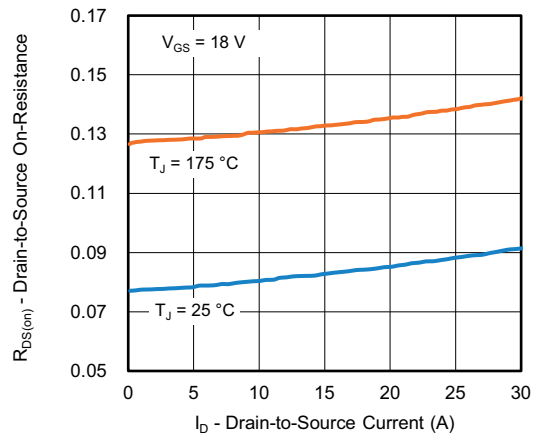
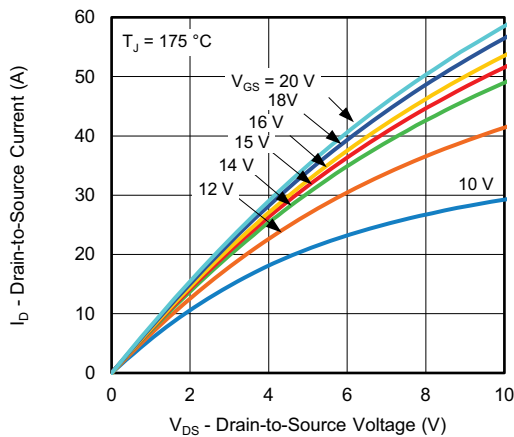
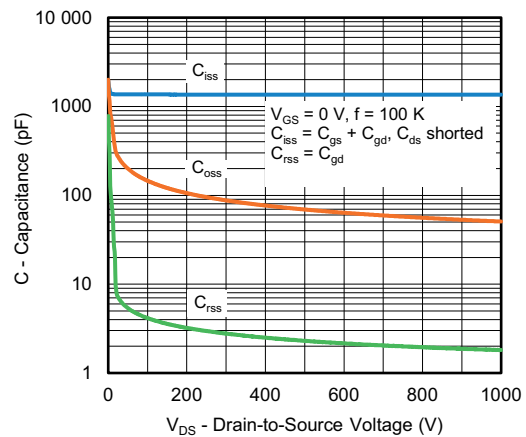
- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{GS} = 18$ V, $V_{DS} = 800$ V, $R_{g(ext)} = 20$ Ω , verified by the design / characterization
- $T_J = 25$ °C, $V_{DD} = 120$ V, $L = 1$ mH, $V_{GS} = 18$ V, $I_{AS} = 15$ A, verified by the design / characterization

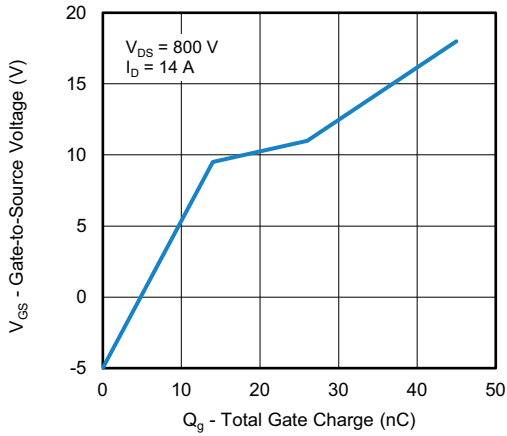
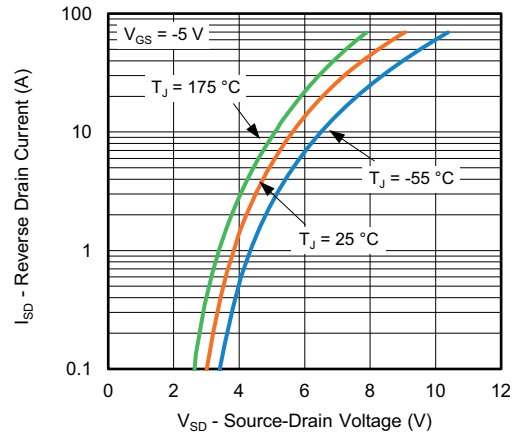
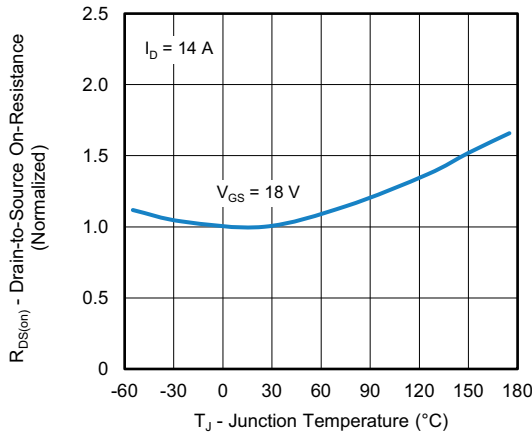
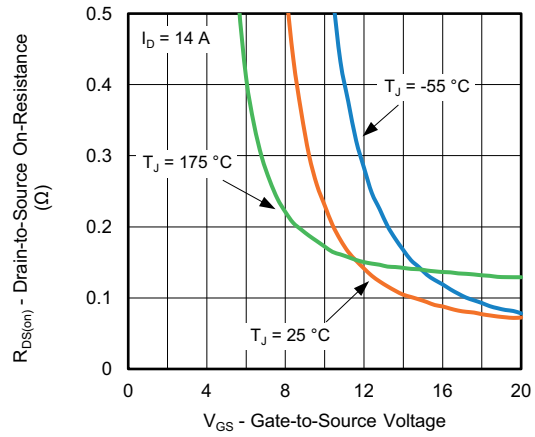
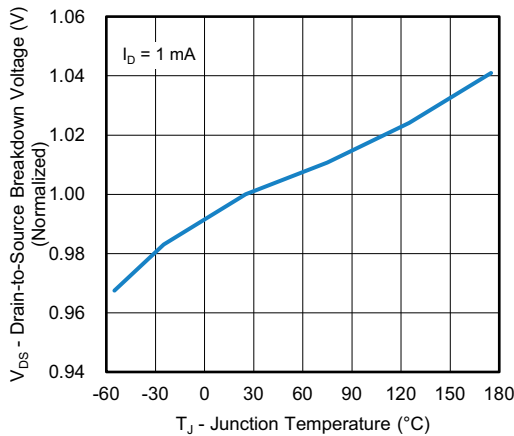
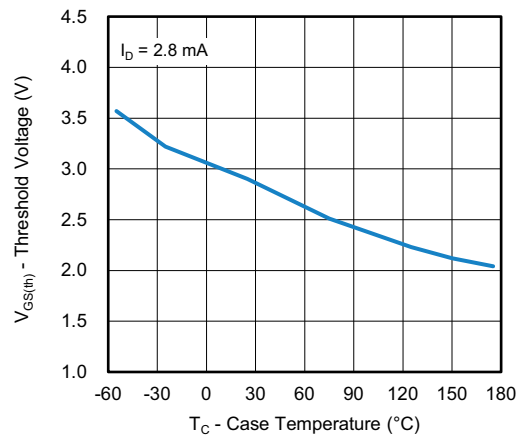


THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.86	

SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	1200	-	-	V	
Gate-source threshold voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 2.8\text{ mA}$	-	2.9	-	V	
		$V_{DS} = V_{GS}, I_D = 2.8\text{ mA}, T_J = 175\text{ °C}$	-	2.0	-	V	
Gate-source leakage	I_{GSS}	$V_{GS} = 22\text{ V}, V_{DS} = 0\text{ V}$	-	-	100	nA	
		$V_{GS} = -10\text{ V}, V_{DS} = 0\text{ V}$	-	-	-100		
Zero gate voltage drain current	I_{DSS}	$V_{DS} = 1200\text{ V}, V_{GS} = 0\text{ V}$	-	-	10	μA	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 15\text{ V}, I_D = 14\text{ A}$	-	97	121	mΩ	
		$V_{GS} = 18\text{ V}, I_D = 14\text{ A}$	-	80	100		
		$V_{GS} = 18\text{ V}, I_D = 14\text{ A}, T_J = 175\text{ °C}$	-	144	-		
Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 14\text{ A}$	-	5.5	-	S	
Dynamic							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 800\text{ V}, f = 100\text{ KHz}$	-	1356	-	pF	
Output capacitance	C_{oss}		-	56	-		
Reverse transfer capacitance	C_{rss}		-	2	-		
Total gate charge	Q_g	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 14\text{ A}, V_{DS} = 800\text{ V}$	-	45	-	nC	
Gate-source charge	Q_{gs}		-	14	-		
Gate-drain charge	Q_{gd}		-	12	-		
Gate Resistance	R_g		$V_{DS} = 0\text{ V}, f = 1\text{ MHz}$	-	4		-
Switching Characteristics							
Turn-on delay time	$t_{d(on)}$	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 14\text{ A}, V_{DS} = 800\text{ V}, R_{g(ext)} = 4.4\text{ Ω}$	$T_J = 25\text{ °C}$	-	14	-	ns
			$T_J = 175\text{ °C}$	-	13	-	
Rise time	t_r		$T_J = 25\text{ °C}$	-	12	-	
			$T_J = 175\text{ °C}$	-	12	-	
Turn-off delay time	$t_{d(off)}$		$T_J = 25\text{ °C}$	-	17	-	
			$T_J = 175\text{ °C}$	-	18	-	
Fall time	t_f		$T_J = 25\text{ °C}$	-	10	-	
			$T_J = 175\text{ °C}$	-	10	-	
Turn-on switching energy	E_{on}		$T_J = 25\text{ °C}$	-	132	-	μJ
			$T_J = 175\text{ °C}$	-	119	-	
Turn-off switching energy	E_{off}	$T_J = 25\text{ °C}$	-	42	-		
		$T_J = 175\text{ °C}$	-	42	-		
Body Diode Ratings and Characteristic							
Forward diode voltage	V_{SD}	$V_{GS} = -5\text{ V}, I_{SD} = 7\text{ A}, T_J = 25\text{ °C}$	-	4.7	-	V	
Continuous diode forward current	I_{SD}	$V_{GS} = -5\text{ V}, T_J = 25\text{ °C}$	-	-	24	A	
Pulsed diode forward current	I_{SDM}		-	-	62		
Reverse recovery time	t_{rr}	$V_{GS} = -5\text{ V}, I_{SD} = 14\text{ A}, V_R = 800\text{ V}, di/dt = 1000\text{ A/μs}$	-	16	-	ns	
Reverse recovery charge	Q_{rr}		-	47	-	nC	
Reverse recovery current	I_{RRM}		-	5	-	A	

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

Fig. 1 Typical Output Characteristics

Fig. 4 Typical Transfer Characteristics

Fig. 2 Typical Output Characteristics

Fig. 5 Normalized On-Resistance vs. Drain Current

Fig. 3 Typical Output Characteristics

Fig. 6 Typical Capacitance vs. Drain-to-Source Voltage


Fig. 7 Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 10 Typical Source-Drain Diode Forward Voltage

Fig. 8 Normalized On-Resistance vs. Temperature

Fig. 11 On-Resistance vs. Gate-to-Source Voltage

Fig. 9 Drain-to-Source Voltage vs. Temperature

Fig. 12 Threshold Voltage vs. Case Temperature

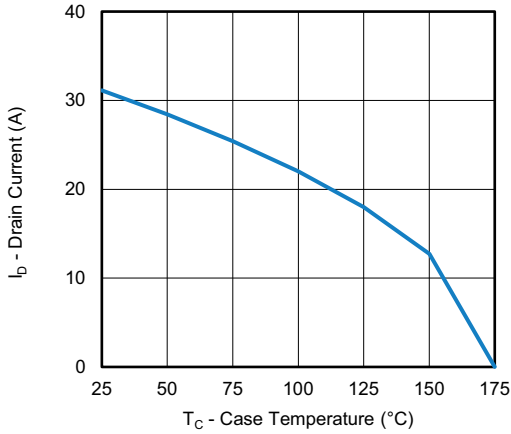


Fig. 13 Drain Current vs. Case Temperature

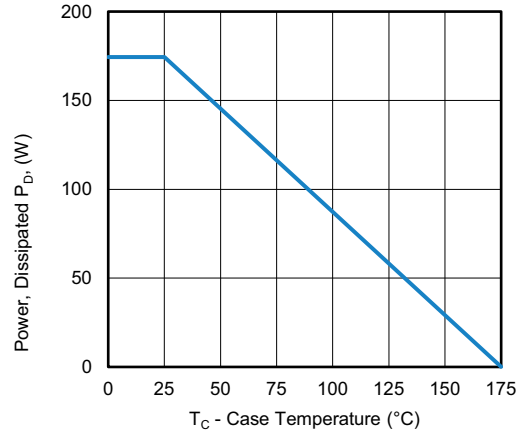


Fig. 15 Power, Dissipated P_D vs. Case Temperature

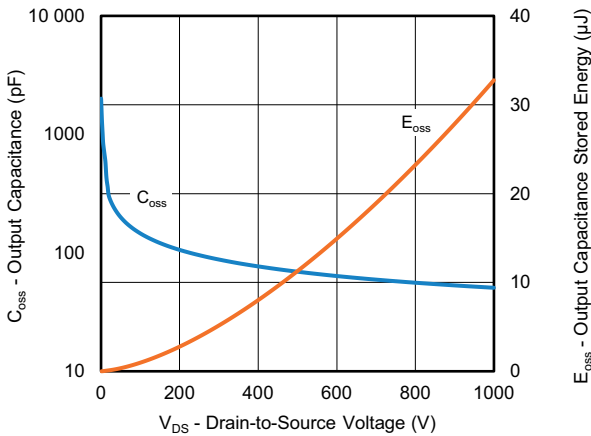


Fig. 14 Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

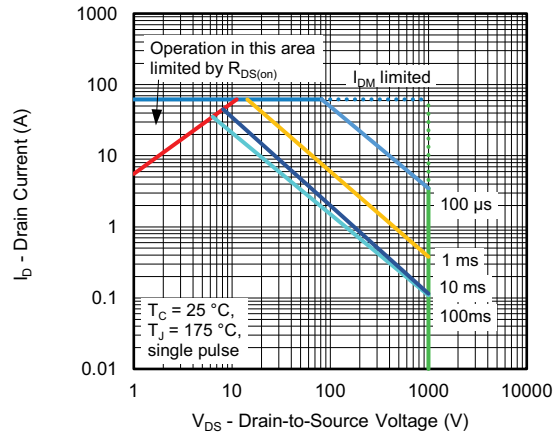


Fig. 16 Safe Operating Area

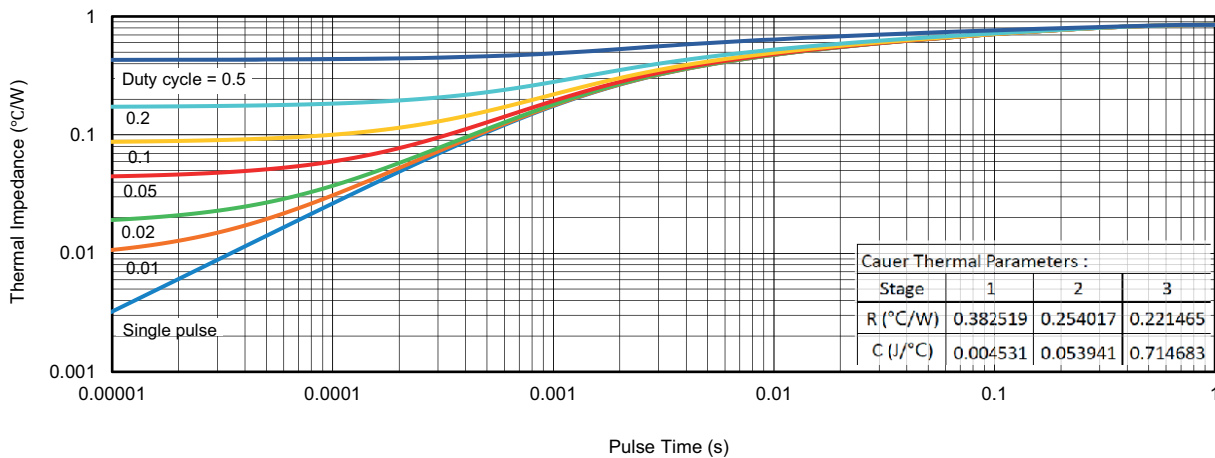


Fig. 17 Transient Thermal Impedance

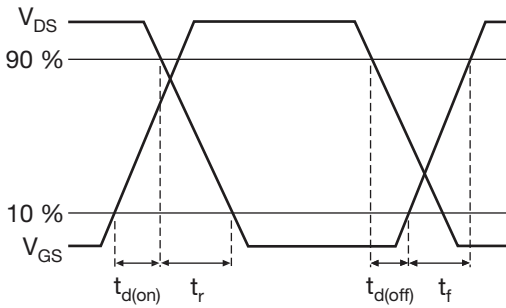


Fig. 18 Waveforms of Switching Time

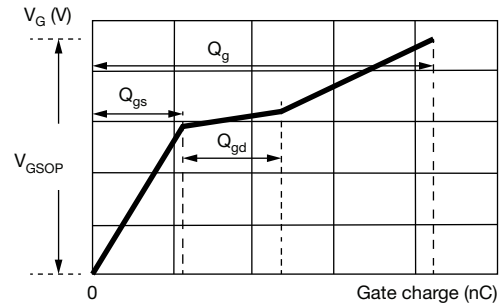


Fig. 21 Waveforms for Gate Charge

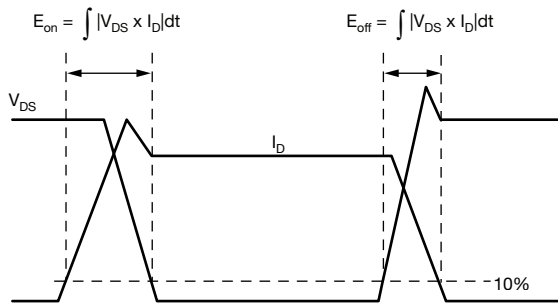


Fig. 19 Waveforms for Switching Energy

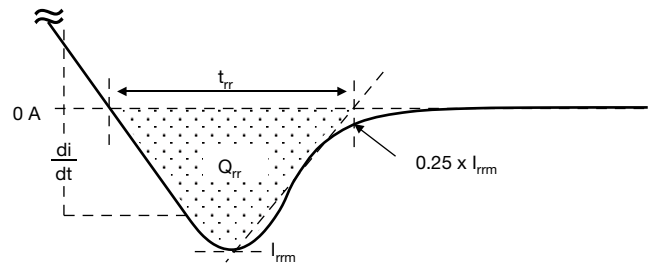


Fig. 22 Waveforms for Reverse Recovery

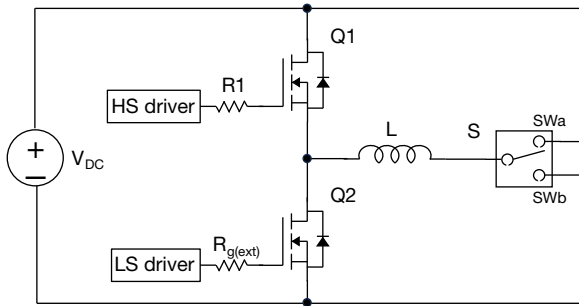


Fig. 20 Switching and Reverse Diode Characteristics Measurement Circuit

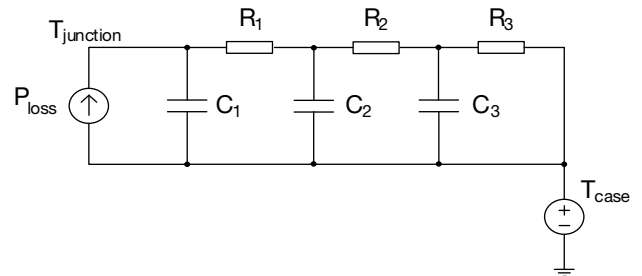


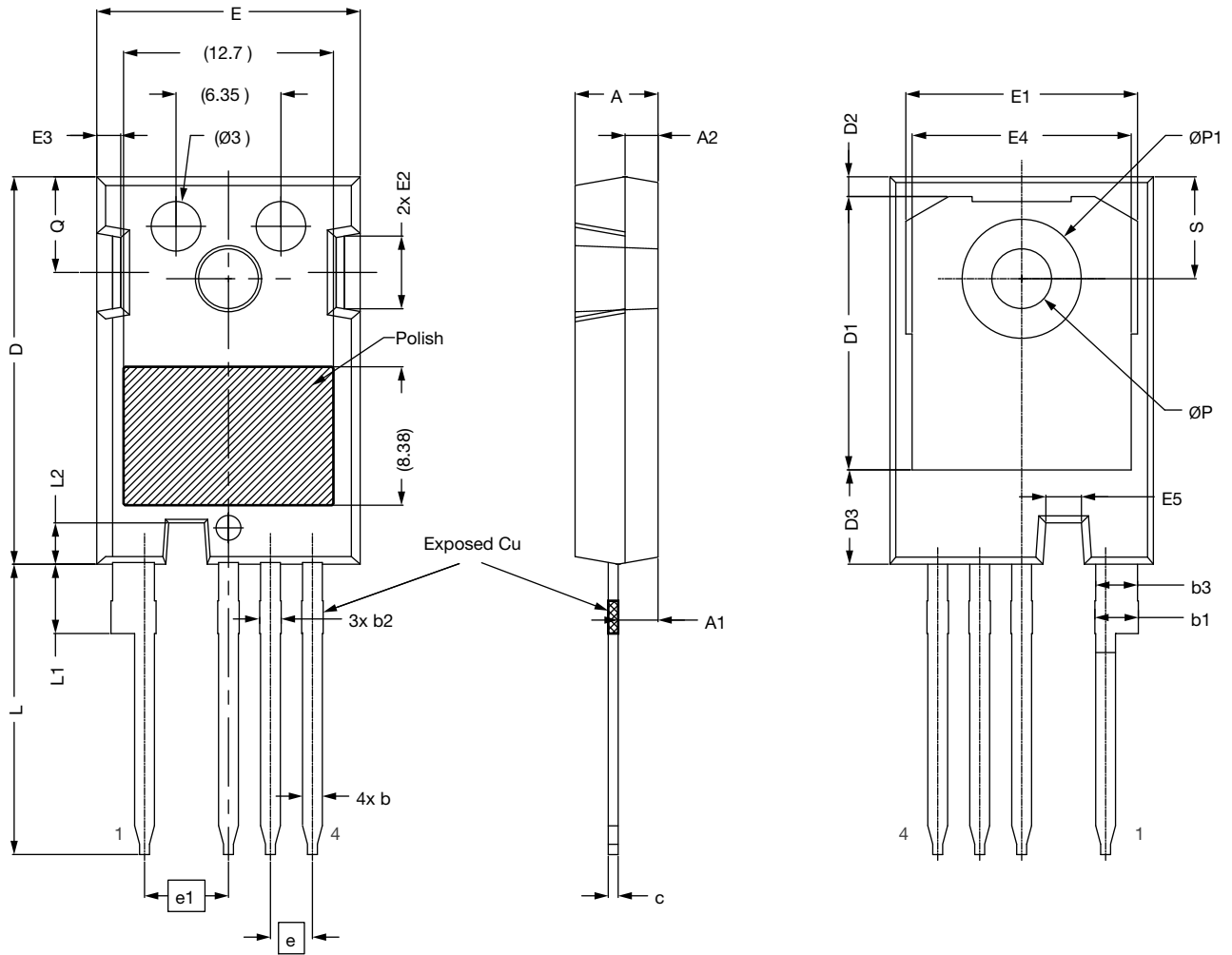
Fig. 23 Thermal Equivalent Circuit

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Case Outline for TO-247AD 4L Package

FACILITY CODE: 9





DIM.	MILLIMETERS	
	MIN.	MAX.
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b	1.07	1.33
b1	2.39	2.94
b3	1.07	1.60
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
E5	1.95	2.35
e	2.54 BSC.	
e1	5.08 BSC.	
L	17.31	17.82
L1	3.97	4.37
L2	2.35	2.65
ØP	3.51	3.65
Q	5.49	6.00
S	6.04	6.30

Notes

- All dimensions are in mm. Angles are in degrees
- Dimension D and E do not include mold flash
- All metal surfaces: tin plated, except area of cut
- Dimensioning and toleranceing confirm to ASME Y14.5M-1994
- Creepage 1 is 8.58 mm (ref.) which is the distance alongside the surface between drain (pin 1) and trough the notch towards source (pin 2).
Creepage 2 is 7.95 mm (ref.) which is the distance from end of the copper slug on the backside of the package to either pin 2, pin 3 or pin 4



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.83	5.02	5.21
A1	2.29	2.41	2.54
A2	1.91	2.00	2.16
b	1.07	1.20	1.33
b1	2.39	2.67	2.94
b2	1.07	1.30	1.60
b3	2.39	2.53	2.69
c	0.55	0.60	0.68
D	23.30	23.45	23.60
D1	16.25	16.55	17.65
D2	0.95	1.19	1.25
D3	5.55	5.71	6.01
E	15.75	15.94	16.13
E1	13.10	14.02	14.15
E2	3.68	4.40	5.10
E3	1.00	1.45	1.90
E4	12.38	13.26	13.43
E5	1.95	2.15	2.35
e	2.54 BSC.		
e1	5.08 BSC.		
L	17.31	17.57	17.82
L1	3.97	4.19	4.37
L2	2.35	2.50	2.65
ØP	3.51	3.61	3.65
ØP1	7.19 ref.		
Q	5.49	5.79	6.00
S	6.04	6.17	6.30
ECN: S25-0851-Rev. C, 18-Jul-2025 DWG: 6121			

Notes

- All dimensions are in mm
- Dimension D and E do not include mold flash.
- Creepage 1 is 8.40 mm (ref.) which is the distance alongside the surface between drain (pin 1) and trough the notch towards source (pin 2).
Creepage 2 is 7.70 mm (ref.) which is the distance from end of the copper slug on the backside of the package to either pin 2, pin 3 or pin 4



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