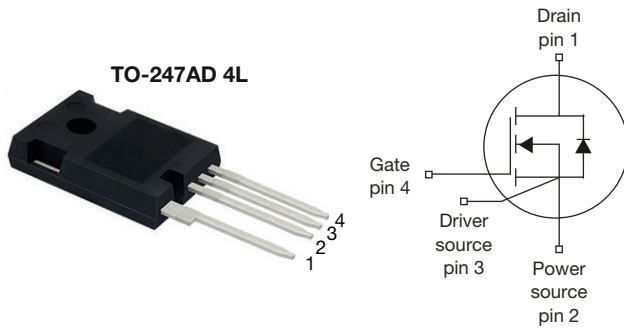


MaxSiC[®] 1200 V N-Channel SiC MOSFET


Marking Code: 120A063SL

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
- 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 63
Q_g typ. (nC)	61
I_D (A)	39
C_{oss} typ. (pF)	70
P_D (W)	205
Configuration	Single

ORDERING INFORMATION	
Package	TO-247AD 4L
Lead (Pb)-free and halogen-free	MXP120A063SL-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	39	A
Pulsed drain current ^a		I_{DM}	78	
Short-circuit withstand time ^b		T_{SC}	3	μ s
Maximum power dissipation	$T_C = 25$ °C	P_D	205	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}	162	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, $I_{AS} = 18$ 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}	-	0.73	

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)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 3.5\text{ mA}$	-	2.9	-	V	
		$V_{DS} = V_{GS}, I_D = 3.5\text{ mA}, T_J = 175\text{ °C}$	-	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	$R_{DS(on)}$	$V_{GS} = 15\text{ V}, I_D = 18\text{ A}$	-	75	94	mΩ	
		$V_{GS} = 18\text{ V}, I_D = 18\text{ A}$	-	63	79		
		$V_{GS} = 18\text{ V}, I_D = 18\text{ A}, T_J = 175\text{ °C}$	-	107	-		
Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 18\text{ A}$	-	7	-	S	
Dynamic							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 800\text{ V}, f = 100\text{ KHz}$	-	1909	-	pF	
Output capacitance	C_{oss}		-	70	-		
Reverse transfer capacitance	C_{rss}		-	2	-		
Total gate charge	Q_g	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 18\text{ A}, V_{DS} = 800\text{ V}$	-	61	-	nC	
Gate-source charge	Q_{gs}		-	18	-		
Gate-drain charge	Q_{gd}		-	17	-		
Gate Resistance	R_g	$V_{DS} = 0\text{ V}, f = 1\text{ MHz}$	-	3	-	Ω	
Switching Characteristics							
Turn-on delay time	$t_{d(on)}$	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 18\text{ A}, V_{DS} = 800\text{ V}, R_{g(ext)} = 4.4\text{ Ω}$	$T_J = 25\text{ °C}$	-	17	-	ns
Rise time	t_r		$T_J = 175\text{ °C}$	-	15	-	
			$T_J = 25\text{ °C}$	-	14	-	
Turn-off delay time	$t_{d(off)}$		$T_J = 175\text{ °C}$	-	13	-	
			$T_J = 25\text{ °C}$	-	21	-	
Fall time	t_f		$T_J = 175\text{ °C}$	-	23	-	
			$T_J = 25\text{ °C}$	-	10	-	
Turn-on switching energy	E_{on}		$T_J = 175\text{ °C}$	-	10	-	μJ
			$T_J = 25\text{ °C}$	-	175	-	
Turn-off switching energy	E_{off}		$T_J = 175\text{ °C}$	-	151	-	
		$T_J = 25\text{ °C}$	-	57	-		
$T_J = 175\text{ °C}$	-	56	-				
Body Diode Ratings and Characteristic							
Forward diode voltage	V_{SD}	$V_{GS} = -5\text{ V}, I_{SD} = 9\text{ A}, T_J = 25\text{ °C}$	-	4.8	-	V	
Continuous diode forward current	I_{SD}	$V_{GS} = -5\text{ V}, T_J = 25\text{ °C}$	-	-	29	A	
Pulsed diode forward current	I_{SDM}		-	-	78		
Reverse recovery time	t_{rr}	$V_{GS} = -5\text{ V}, I_{SD} = 18\text{ A}, V_R = 800\text{ V}, di/dt = 1000\text{ A/μs}$	-	18	-	ns	
Reverse recovery charge	Q_{rr}		-	60	-	nC	
Reverse recovery current	I_{RRM}		-	6	-	A	

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

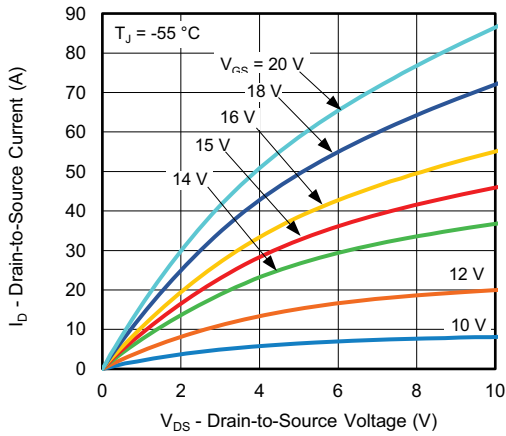


Fig. 1 - Typical Output Characteristics

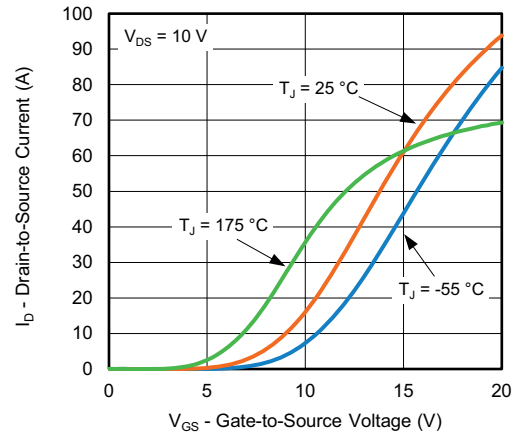


Fig. 4 - Typical Transfer Characteristics

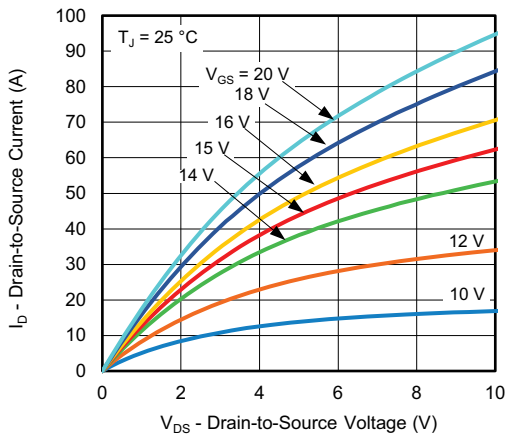


Fig. 2 - Typical Output Characteristics

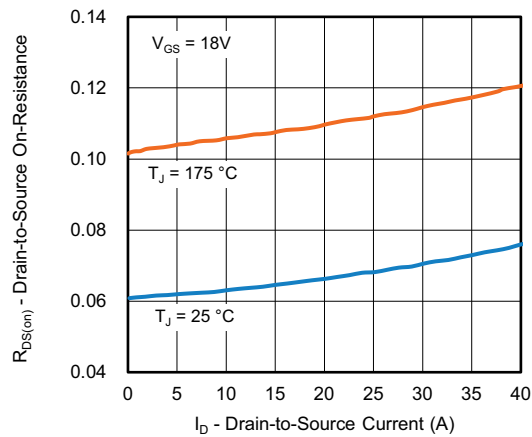


Fig. 5 - Normalized On-Resistance vs. Drain Current

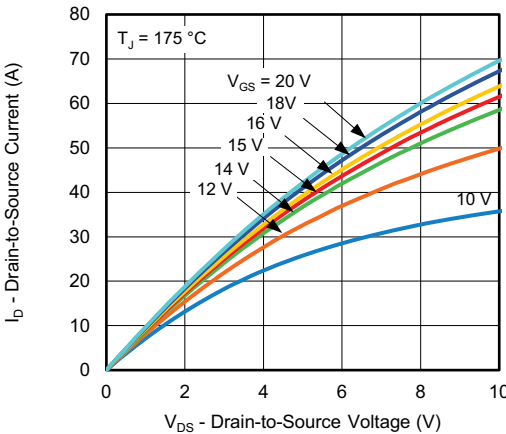


Fig. 3 - Typical Output Characteristics

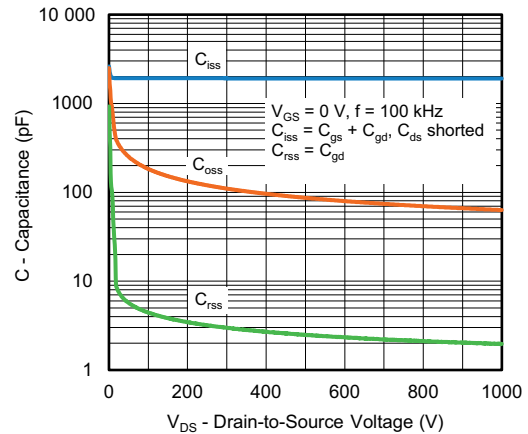


Fig. 6 - Typical Capacitance vs. Drain-to-Source Voltage

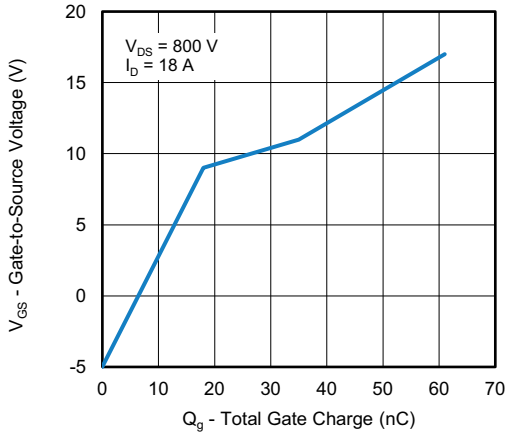


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

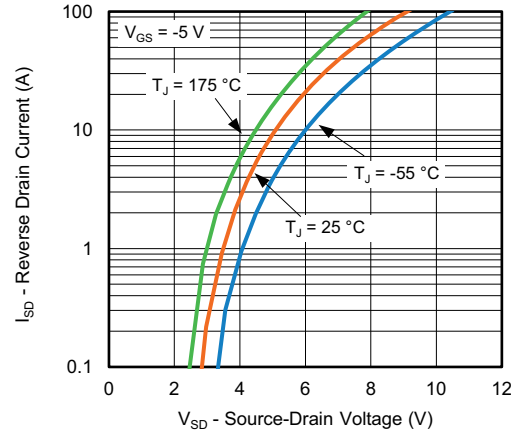


Fig. 10 - Typical Source-Drain Diode Forward Voltage

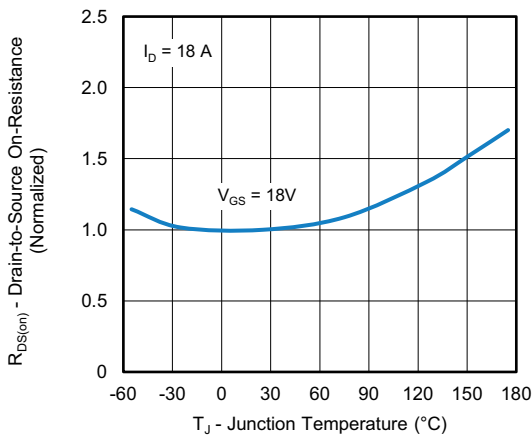


Fig. 8 - Normalized On-Resistance vs. Temperature

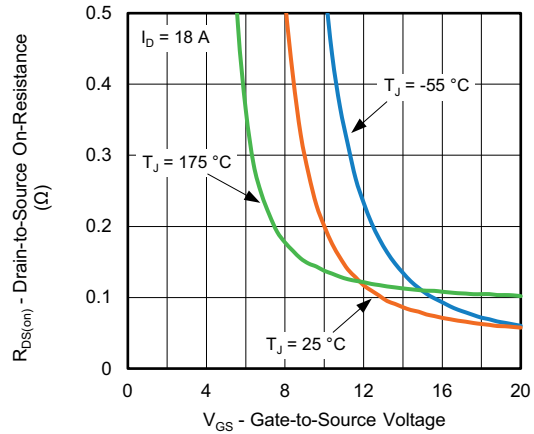


Fig. 11 - On-Resistance vs. Gate-to-Source Voltage

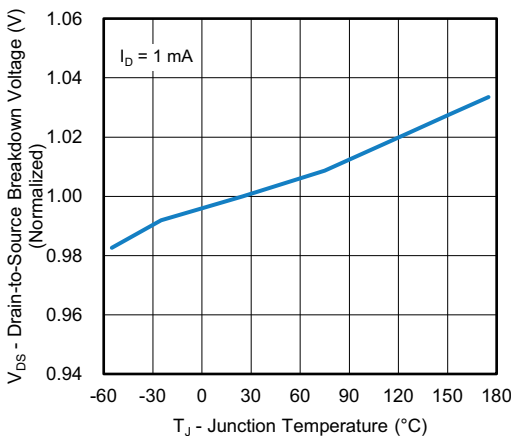


Fig. 9 - Drain-to-Source Voltage vs. Temperature

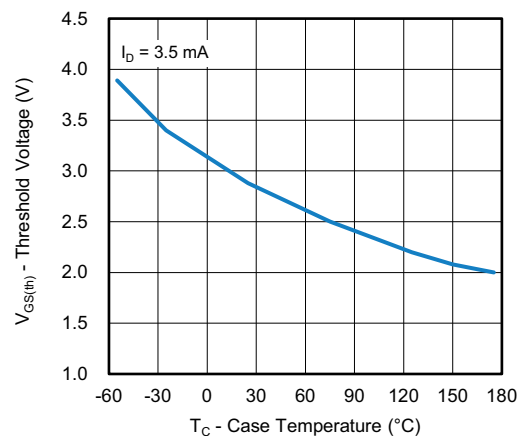


Fig. 12 - Threshold Voltage vs. Case Temperature

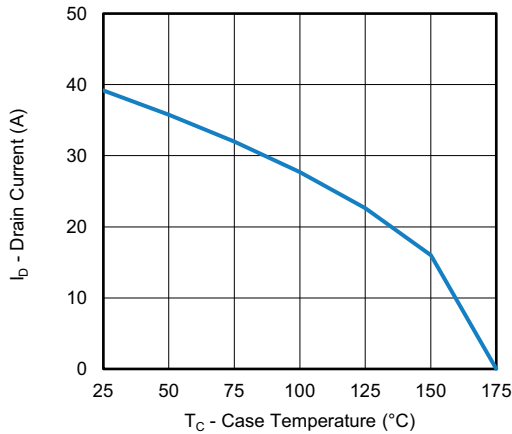


Fig. 13 - Drain Current vs. Case Temperature

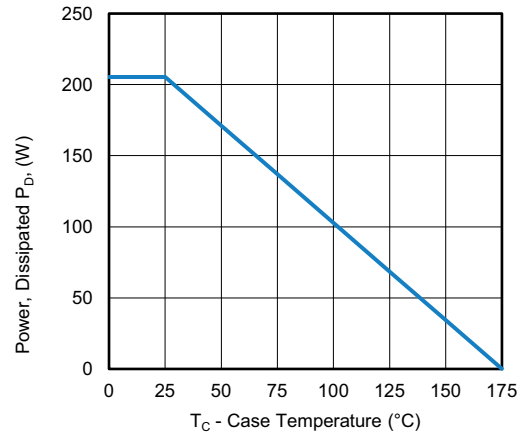


Fig. 15 - Power, Dissipated P_D vs. Case Temperature

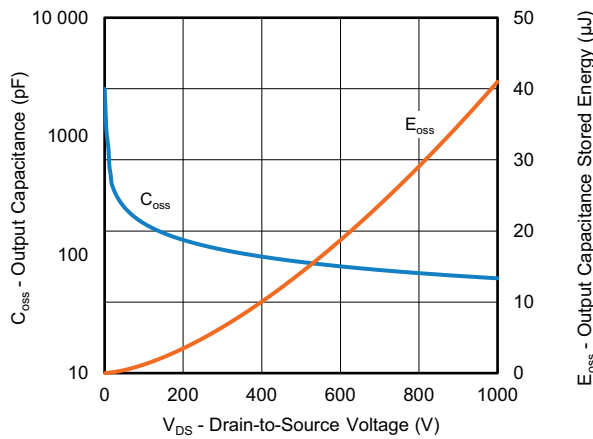


Fig. 14 - Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

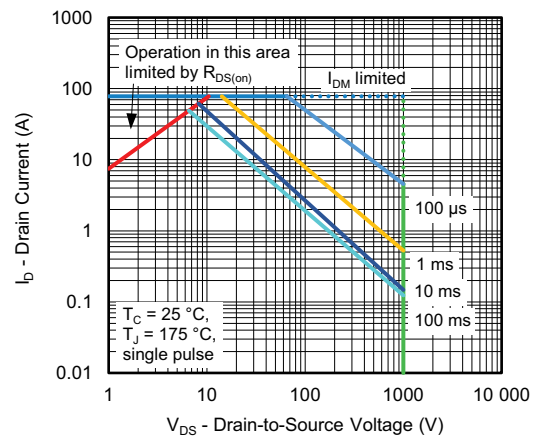


Fig. 16 - Safe Operating Area

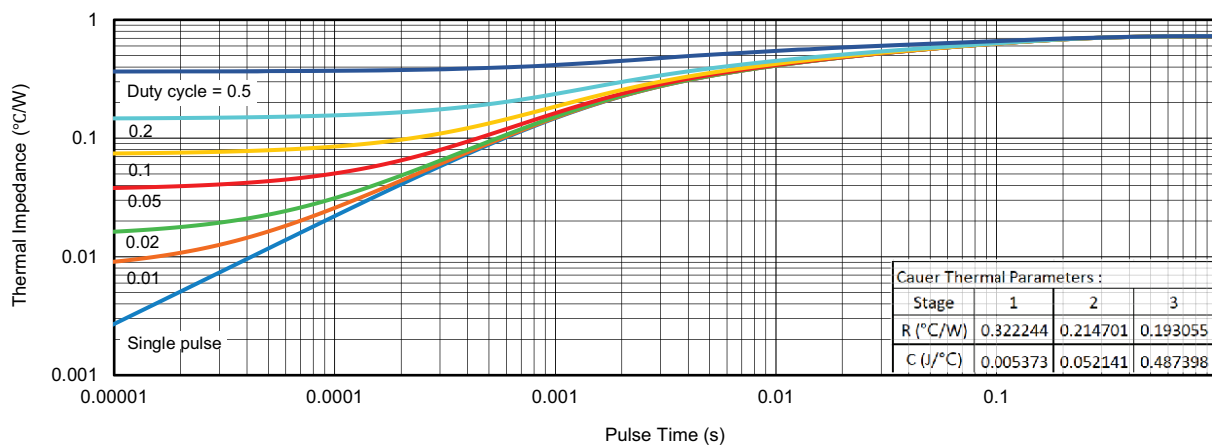


Fig. 17 - Transient Thermal Impedance

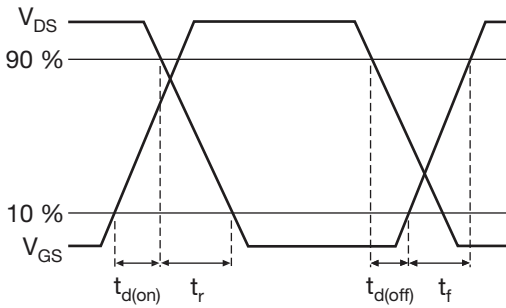


Fig. 18 - Waveforms of Switching Time

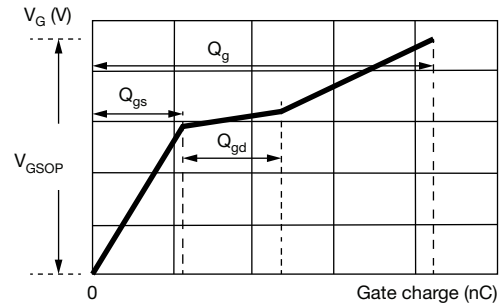


Fig. 21 - Waveforms for Gate Charge

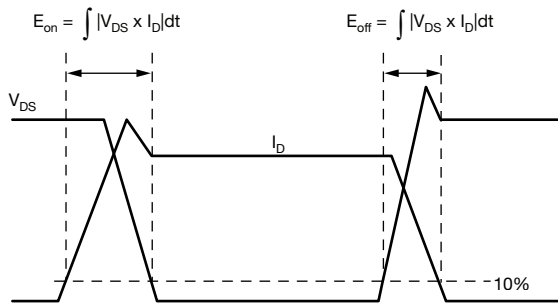


Fig. 19 - Waveforms for Switching Energy

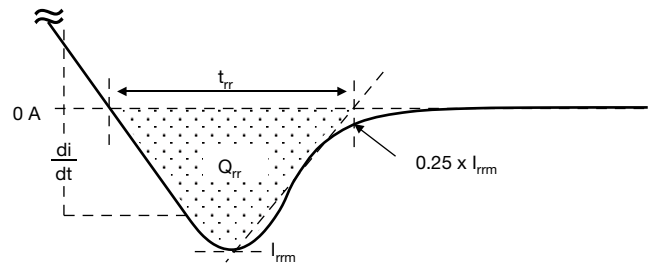


Fig. 22 - Waveforms for Reverse Recovery

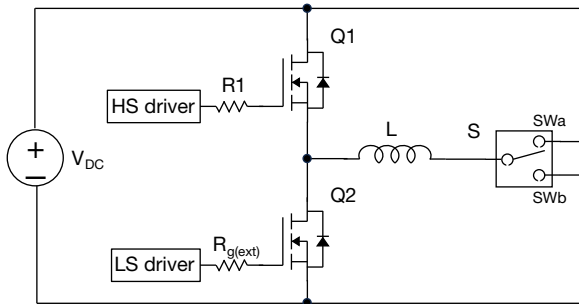


Fig. 20 - Switching and Reverse Diode Characteristics Measurement Circuit

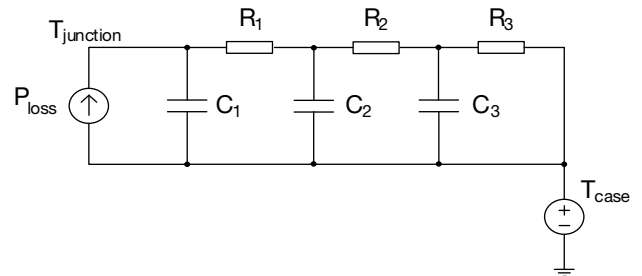


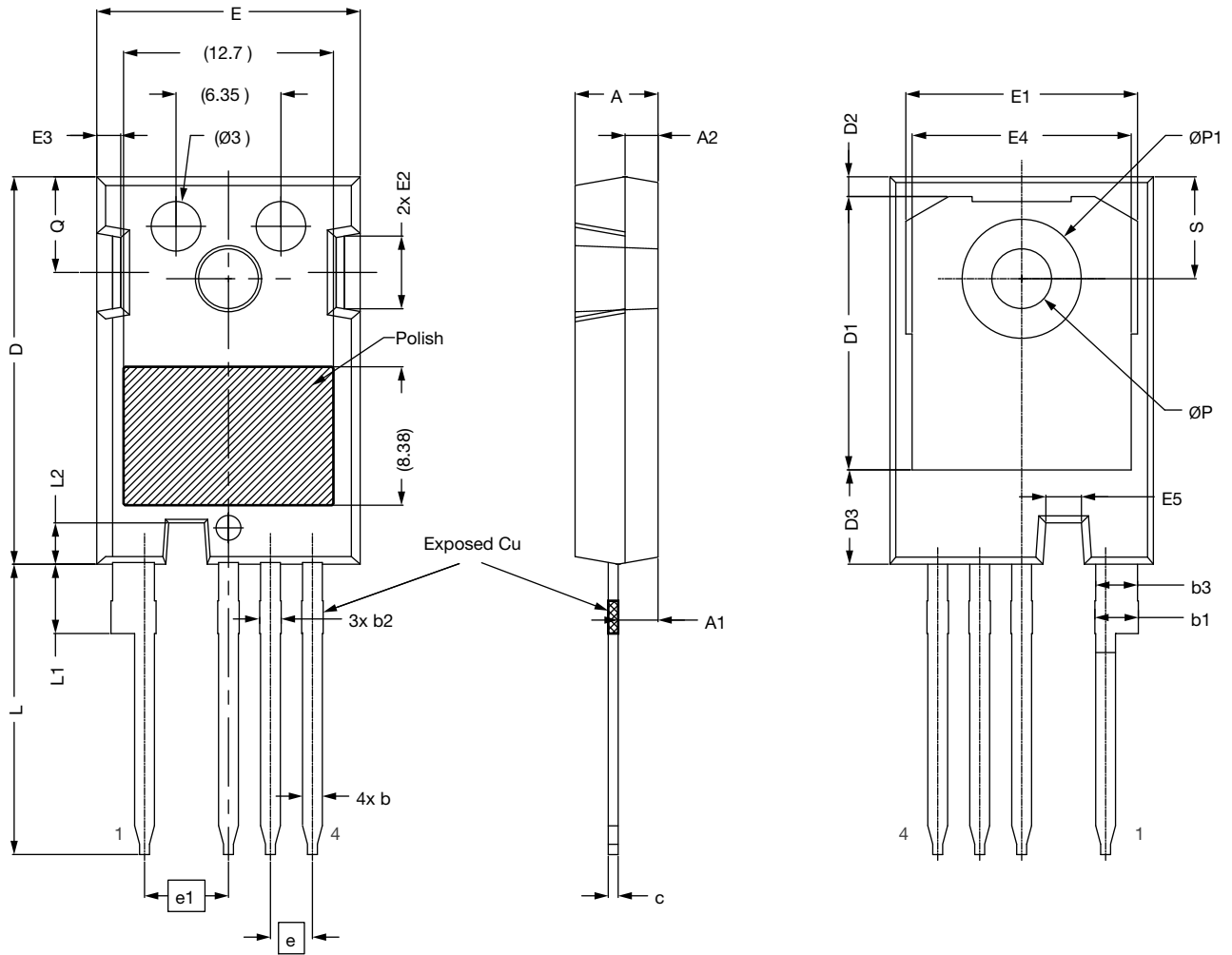
Fig. 23 - Thermal Equivalent Circuit

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Case Outline for TO-247AD 4L Package

FACILITY CODE: 9





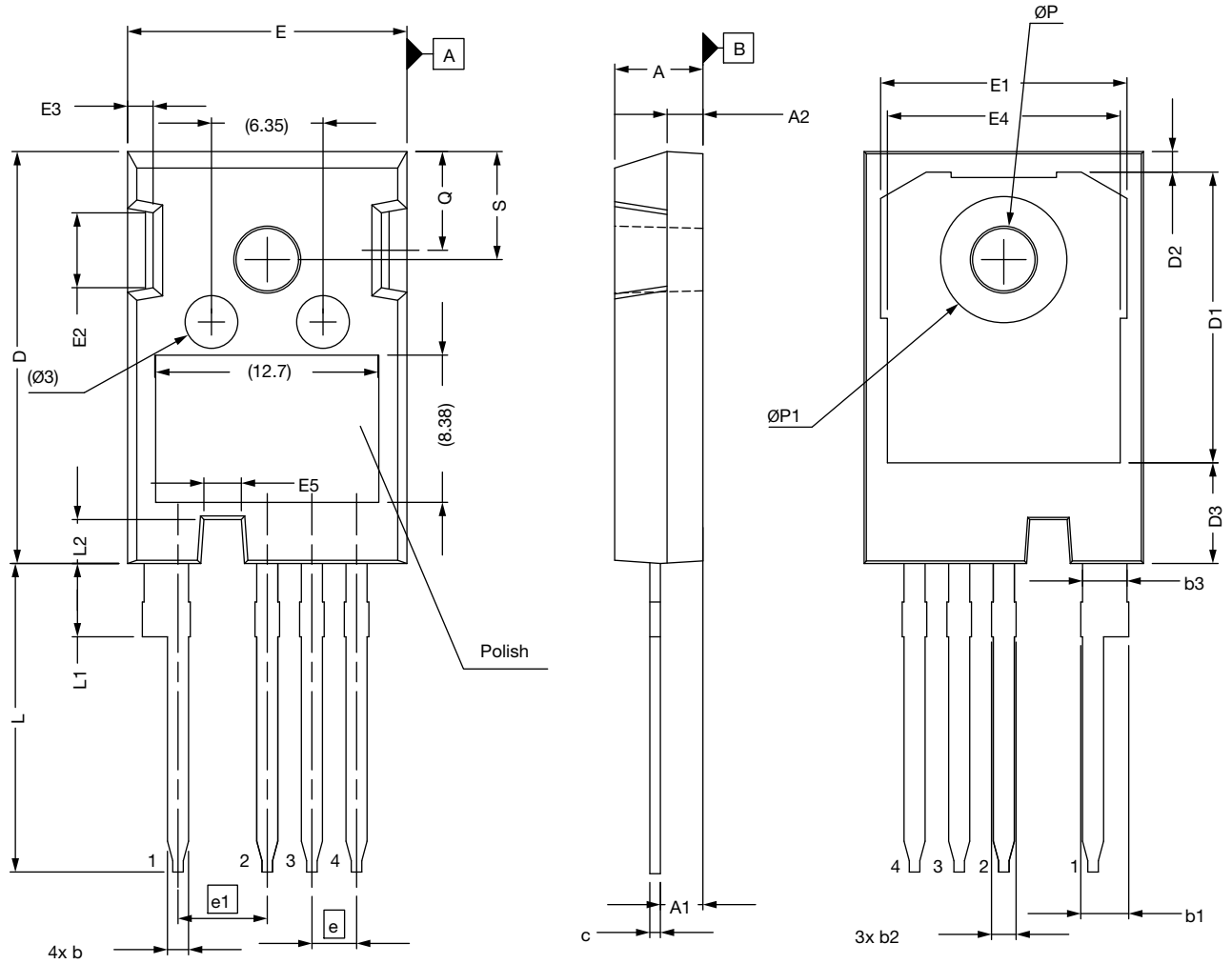
DIM.	MILLIMETERS	
	MIN.	MAX.
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b	1.07	1.33
b1	2.39	2.94
b3	1.07	1.60
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
E5	1.95	2.35
e	2.54 BSC.	
e1	5.08 BSC.	
L	17.31	17.82
L1	3.97	4.37
L2	2.35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



FACILITY CODE: N





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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