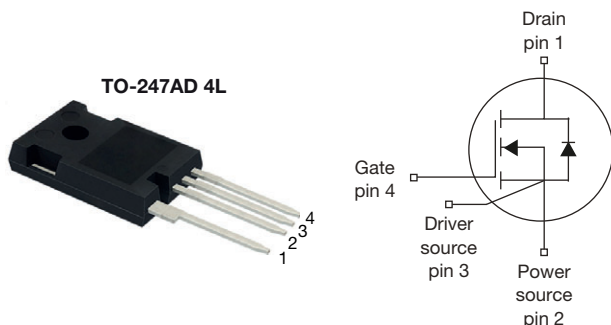


MaxSiC[®] 750 V N-Channel SiC MOSFET



Marking Code: Q075A040SL

PRODUCT SUMMARY		
V_{DS} (V) at T_J max.	750	
$R_{DS(on)}$ typ. (m Ω) at 25 °C	$V_{GS} = 18$ V	40
Q_g typ. (nC)	77	
I_D (A)	51	
C_{oss} typ. (pF)	124	
P_D (W)	208	
Configuration	Single	

ORDERING INFORMATION	
Package	TO-247AD 4L
Lead (Pb)-free and halogen-free	MXPQ075A040SL-GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)				
PARAMETER	SYMBOL	LIMIT	UNIT	
Drain-source voltage	V_{DS}	750	V	
Gate-source voltage	V_{GS}	-10 / +22		
Recommended operation voltage of gate-source	V_{GSOP}	-5 to -3 / +18		
Continuous drain current	I_D	51	A	
Pulsed drain current ^a	I_{DM}	102		
Short-circuit withstand time ^b	T_{SC}	3	μ s	
Maximum power dissipation	P_D	208	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}	540	mJ	

Notes

a. Repetitive rating; pulse width limited by maximum junction temperature

b. $V_{GS} = 18$ V, $V_{DS} = 400$ V, $R_{g(ext)} = 20$ Ω , verified by the design / characterization

c. $T_J = 25$ °C, $V_{DD} = 120$ V, $L = 30$ mH, $V_{GS} = 18$ V, $I_{AS} = 6$ A, verified by the design / characterization

FEATURES

- Fast switching speed
- Short circuit withstand time 3 μ s
- AEC-Q101 qualified
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

APPLICATIONS

- Automotive on board charger
- Automotive DC/DC converter for EV / HEV
- Main inverter (electric traction)



RoHS
COMPLIANT
HALOGEN
FREE

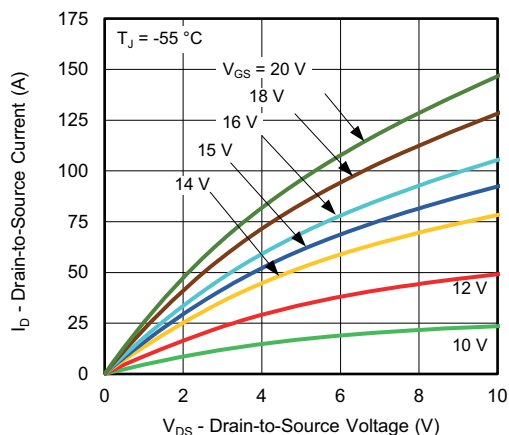
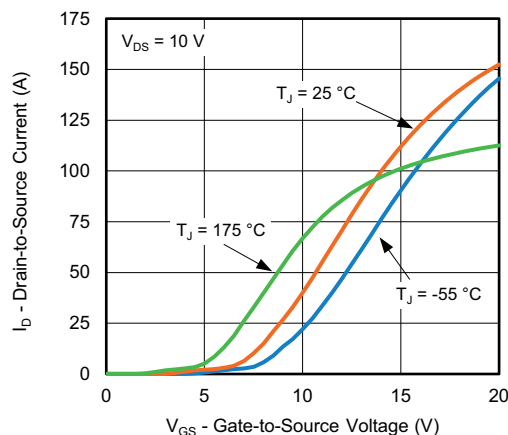
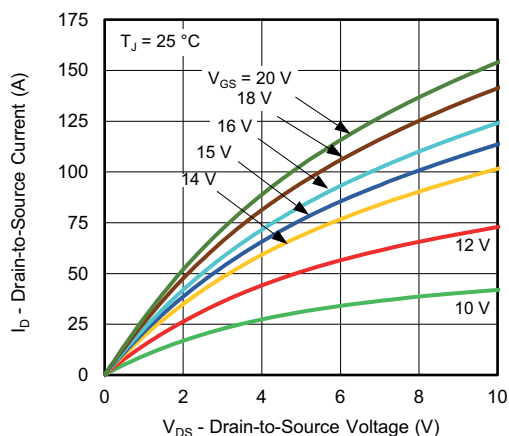
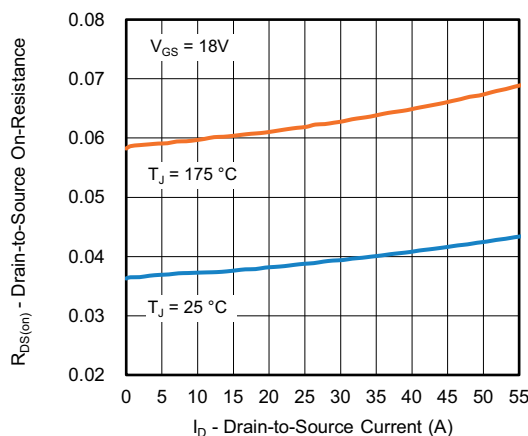
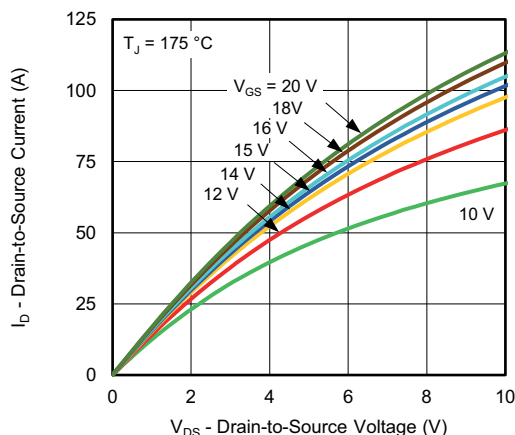
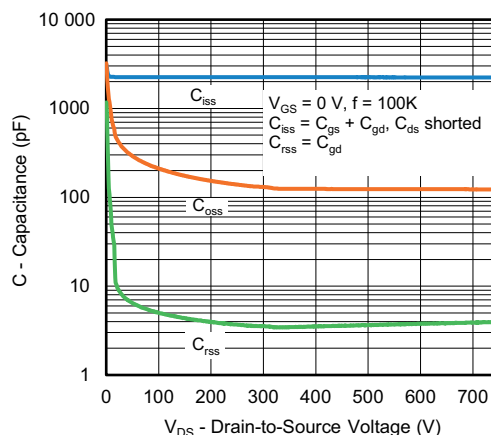
**THERMAL RESISTANCE RATINGS**

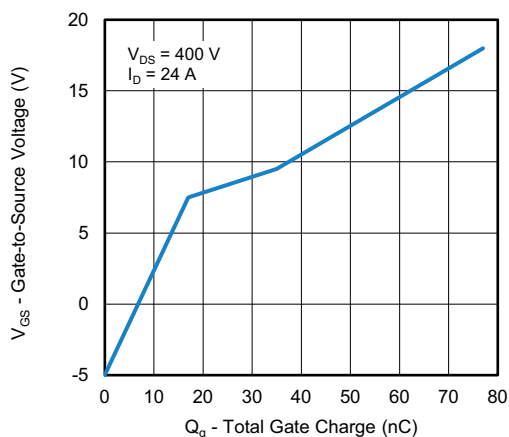
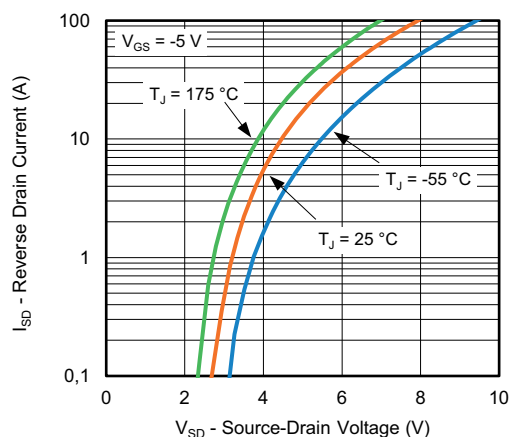
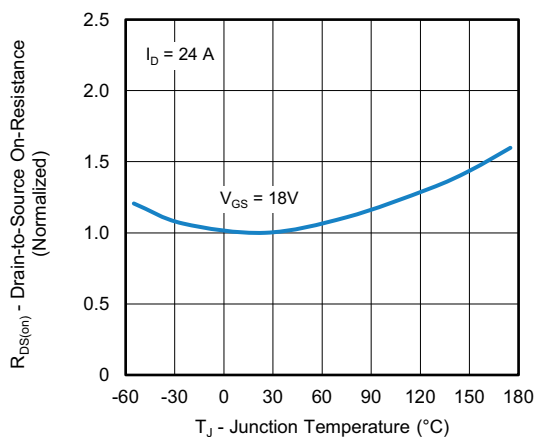
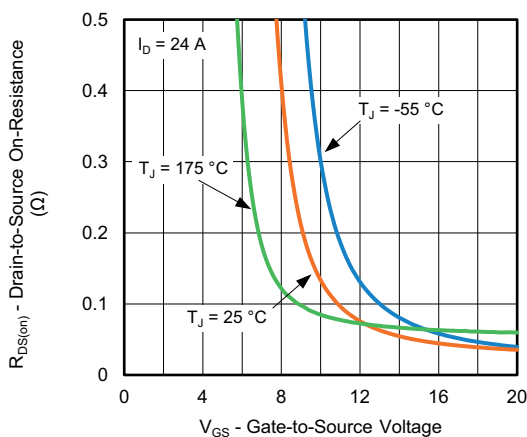
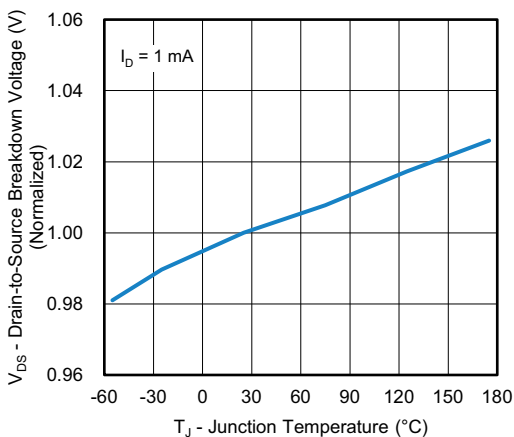
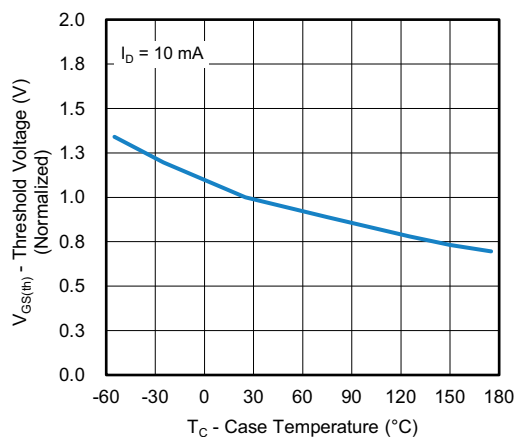
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	40	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.72	

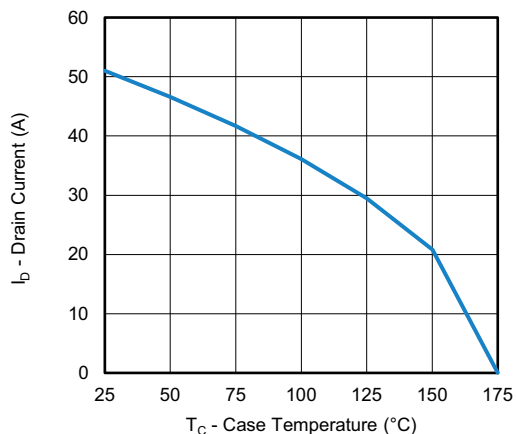
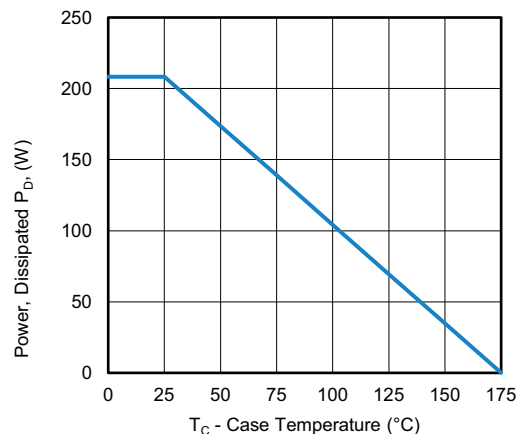
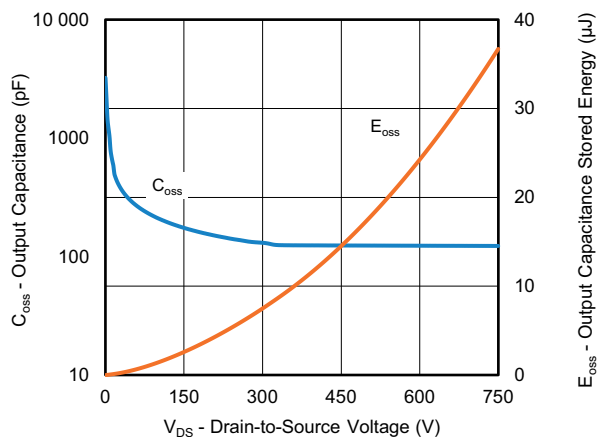
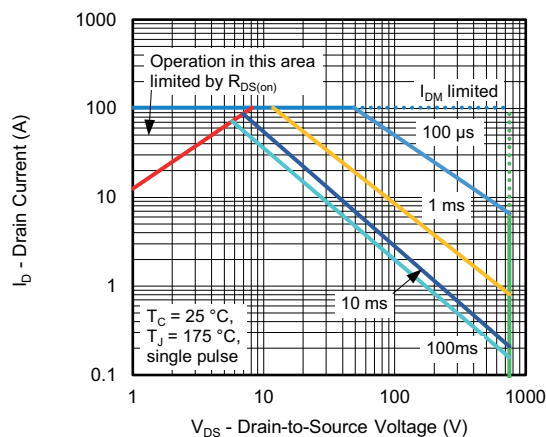
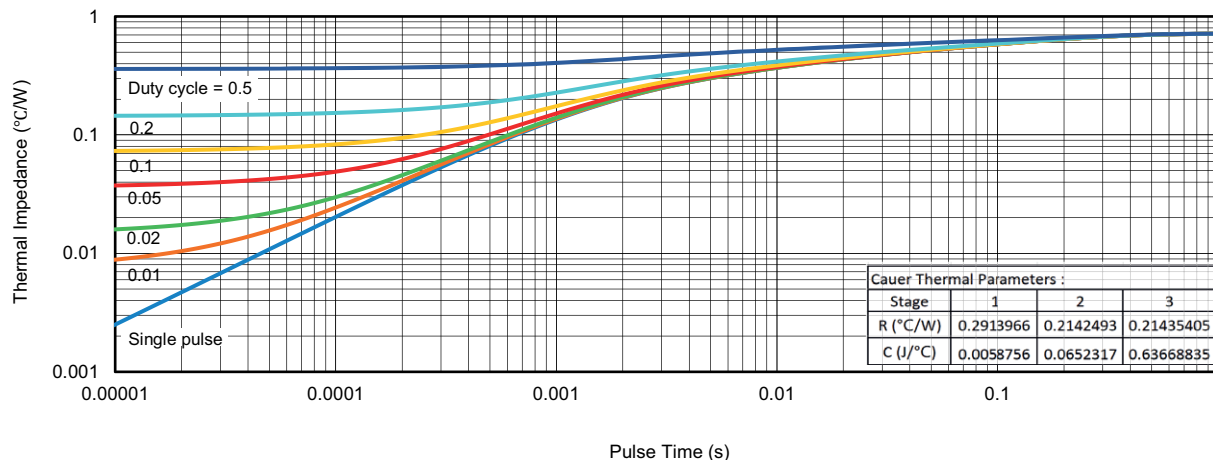
SPECIFICATIONS ($T_J = 25\text{ °C}$, unless otherwise noted)

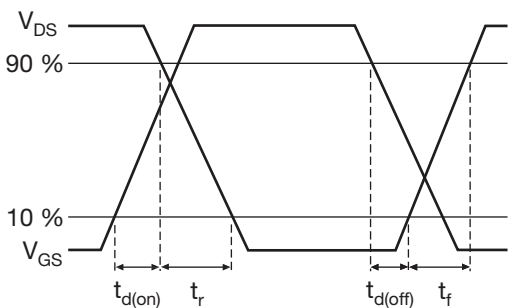
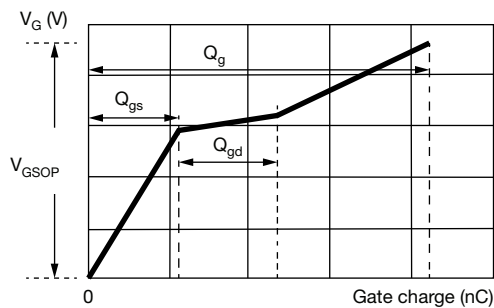
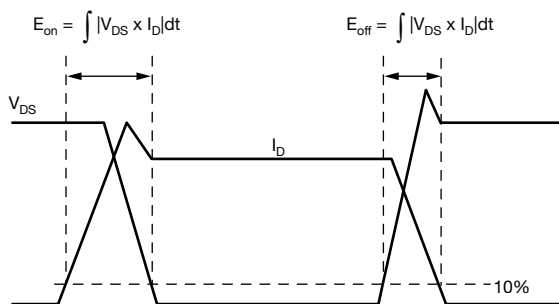
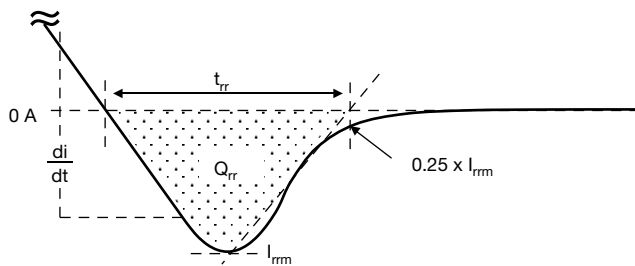
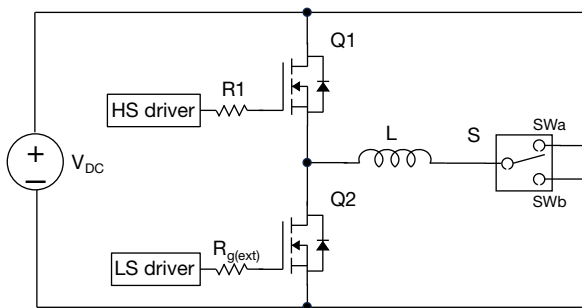
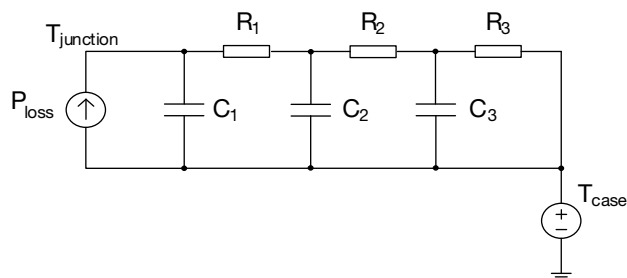
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V _{DS}	V _{GS} = 0 V, I _D = 1 mA	750	-	-	V	
Gate-source threshold voltage (N)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 10 mA	-	2.65	-	V	
		V _{DS} = V _{GS} , I _D = 10 mA, T _J = 175 °C	-	1.8	-	V	
Gate-source leakage	I _{GSS}	V _{GS} = 22 V, V _{DS} = 0 V	-	-	100	nA	
		V _{GS} = -10 V, V _{DS} = 0 V	-	-	-100		
Zero gate voltage drain current	I _{DSS}	V _{DS} = 750 V, V _{GS} = 0 V	-	-	10	μA	
Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 15 V, I _D = 24 A	-	49	61	mΩ	
		V _{GS} = 18 V, I _D = 24 A	-	40	50		
		V _{GS} = 18 V, I _D = 24 A, T _J = 175 °C	-	64	-		
Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 24 A	-	11	-	S	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 400 V, f = 100 KHz	-	2245	-	pF	
Output capacitance	C _{oss}		-	124	-		
Reverse transfer capacitance	C _{rss}		-	4	-		
Total gate charge	Q _g	V _{GS} = -5 V ~ 18 V, I _D = 24 A, V _{DS} = 400 V	-	77	-	nC	
Gate-source charge	Q _{gs}		-	17	-		
Gate-drain charge	Q _{gd}		-	18	-		
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz	-	2.4	-	Ω	
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 24 A, V _{DS} = 400 V, R _{g(ext)} = 4.4 Ω	T _J = 25 °C	-	13	-	ns
Rise time	t _r		T _J = 175 °C	-	12	-	
			T _J = 25 °C	-	13	-	
			T _J = 175 °C	-	12	-	
			T _J = 25 °C	-	23	-	
Turn-off delay time	t _{d(off)}		T _J = 175 °C	-	26	-	
			T _J = 25 °C	-	6	-	
Fall time	t _f		T _J = 175 °C	-	6	-	
			T _J = 25 °C	-	35	-	
Turn-on switching energy	E _{on}		T _J = 175 °C	-	29	-	μJ
Turn-off switching energy	E _{off}		T _J = 25 °C	-	34	-	
Body Diode Ratings and Characteristic							
Forward diode voltage	V _{SD}	V _{GS} = -5 V, I _{SD} = 12 A, T _J = 25 °C	-	4.6	-	V	
Continuous diode forward current	I _{SD}	V _{GS} = -5 V, T _J = 25 °C	-	-	32	A	
Pulsed diode forward current	I _{SDM}		-	-	102		
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 24 A, V _R = 400 V, di/dt = 1000 A/μs	-	17	-	ns	
Reverse recovery charge	Q _{rr}		-	67	-	nC	
Reverse recovery current	I _{RRM}		-	7	-	A	

Notea. Test after 1 ms pulse at $V_{GS} = 22\text{ V}$

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

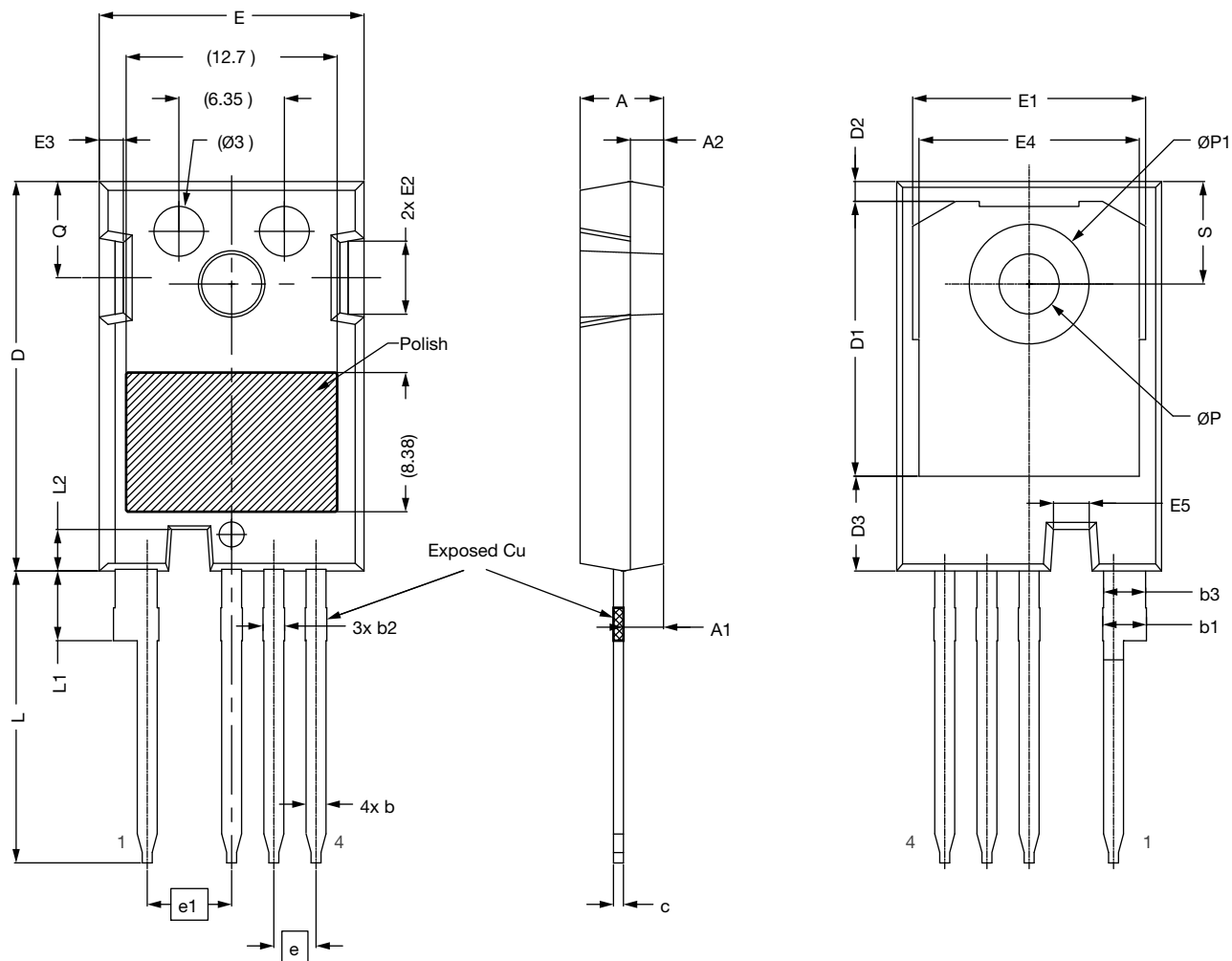

Fig. 18 Waveforms of Switching Time

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

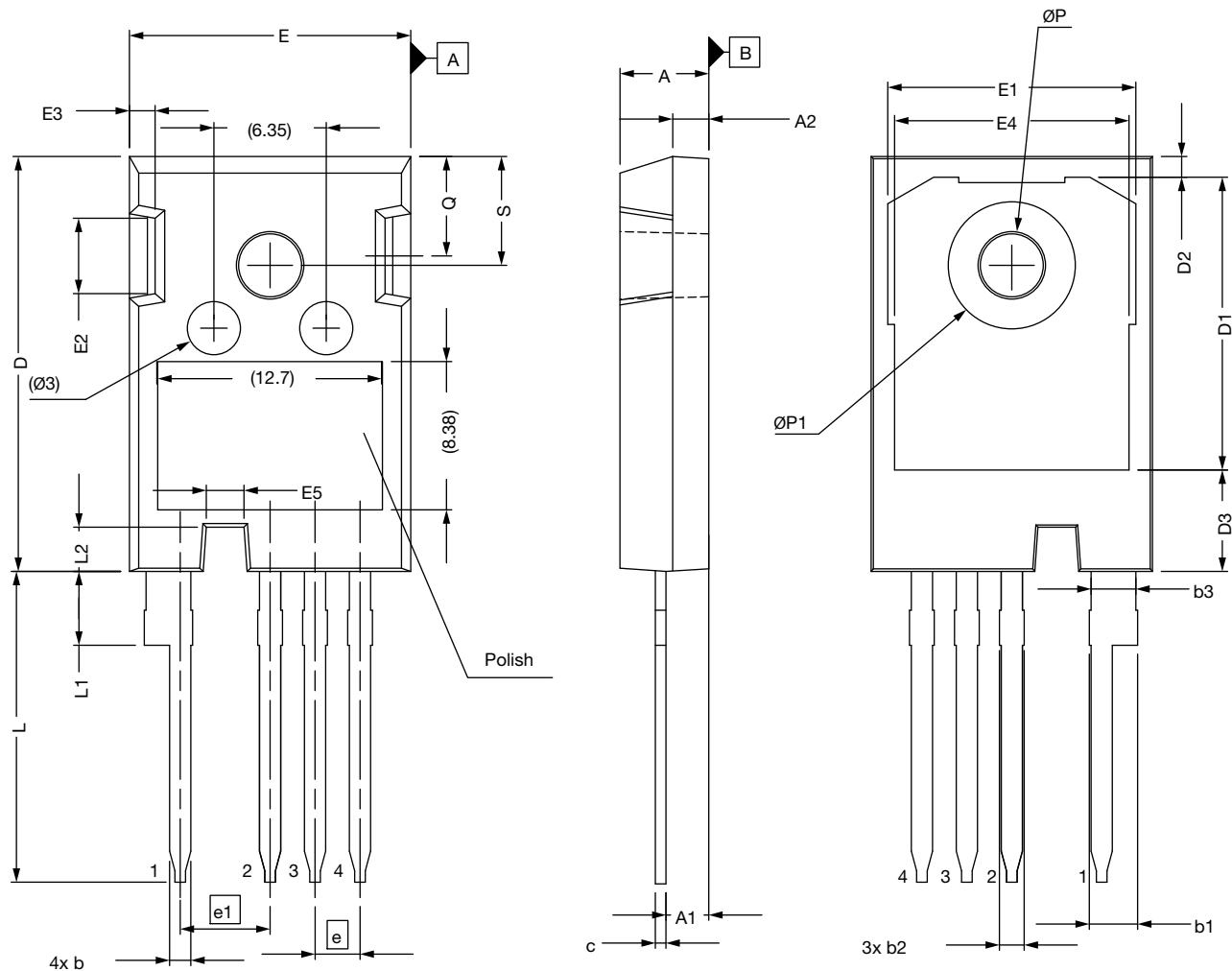




DIM.	MILLIMETERS	
	MIN.	MAX.
A	4.83	5.21
A1	2.29	2.54
A2	1.91	2.16
b	1.07	1.33
b1	2.39	2.94
b3	1.07	1.60
c	0.55	0.68
D	23.30	23.60
D1	16.25	17.65
D2	0.95	1.25
E	15.75	16.13
E1	13.10	14.15
E2	3.68	5.10
E3	1.00	1.90
E4	12.38	13.43
E5	1.95	2.35
e	2.54 BSC.	
e1	5.08 BSC.	
L	17.31	17.82
L1	3.97	4.37
L2	2.35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