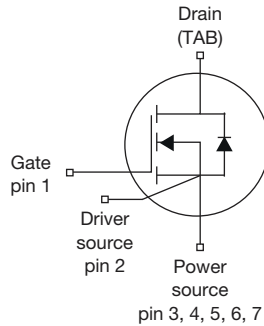
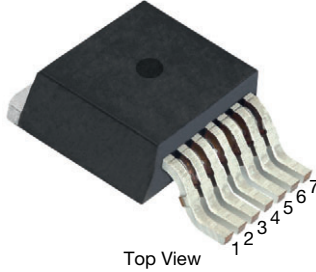


MaxSiC[®] 1200 V N-Channel SiC MOSFET

D²PAK 7L (TO-263 7L)

Marking Code: Q120A045SE

PRODUCT SUMMARY	
V _{DS} (V) at T _J max.	1200
R _{DS(on)} typ. (mΩ) at 25 °C	V _{GS} = 18 V 45
Q _g typ. (nC)	82
I _D (A)	52
C _{oss} typ. (pF)	91
P _D (W)	268
Configuration	Single

ORDERING INFORMATION	
Package	D ² PAK 7L (TO-263 7L)
Lead (Pb)-free and halogen-free	MXPQ120A045SE-1GE3

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	52	A
Pulsed drain current ^a		I _{DM}	104	
Short-circuit withstand time ^b		T _{SC}	3	μs
Maximum power dissipation	T _C = 25 °C	P _D	268	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}	200	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} = 20 A

FEATURES

- AEC-Q101 qualified
- Fast switching speed
- Short circuit withstand time 3 μs
- 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
- Auxiliary drives
- EV Charging

AUTOMOTIVE GRADE


RoHS
 COMPLIANT
 HALOGEN
FREE



THERMAL RESISTANCE RATINGS				
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R _{thJA}	-	42	°C/W
Maximum junction-to-case (drain)	R _{thJC}	-	0.56	

SPECIFICATIONS (T _J = 25 °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	1200	-	-	V	
Gate-source threshold voltage (N)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 5 mA	-	2.8	-	V	
		V _{DS} = V _{GS} , I _D = 5 mA, T _J = 175 °C	-	1.9	-	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} = 1200 V, V _{GS} = 0 V	-	-	10	µA	
Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 15 V, I _D = 26 A	-	60	75	mΩ	
		V _{GS} = 18 V, I _D = 26 A	-	45	56		
		V _{GS} = 18 V, I _D = 26 A, T _J = 175 °C	-	82	-		
Transconductance	g _{fs}	V _{DS} = 10 V, I _D = 26 A	-	10	-	S	
Dynamic							
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 100 KHz	-	2483	-	pF	
Output capacitance	C _{oss}		-	91	-		
Reverse transfer capacitance	C _{rss}		-	3	-		
Total gate charge	Q _g	V _{GS} = -5 V ~ 18 V, I _D = 26 A, V _{DS} = 800 V	-	82	-	nC	
Gate-source charge	Q _{gs}		-	25	-		
Gate-drain charge	Q _{gd}		-	22	-		
Gate Resistance	R _g		V _{DS} = 0 V, f = 1 MHz	-	3		-
Switching Characteristics							
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 26 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω	T _J = 25 °C	-	23	-	ns
			T _J = 175 °C	-	22	-	
Rise time	t _r		T _J = 25 °C	-	12	-	
			T _J = 175 °C	-	11	-	
Turn-off delay time	t _{d(off)}		T _J = 25 °C	-	25	-	
			T _J = 175 °C	-	27	-	
Fall time	t _f		T _J = 25 °C	-	10	-	
			T _J = 175 °C	-	10	-	
Turn-on switching energy	E _{on}		T _J = 25 °C	-	273	-	µJ
			T _J = 175 °C	-	261	-	
Turn-off switching energy	E _{off}		T _J = 25 °C	-	74	-	
			T _J = 175 °C	-	73	-	
Body Diode Ratings and Characteristic							
Forward diode voltage	V _{SD}	V _{GS} = -5 V, I _{SD} = 13 A, T _J = 25 °C	-	4.9	-	V	
Continuous diode forward current	I _{SD}	V _{GS} = -5 V, T _J = 25 °C	-	-	38	A	
Pulsed diode forward current	I _{SDM}		-	-	104		
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 26 A, V _R = 800 V, di/dt = 1000 A/µs	-	19	-	ns	
Reverse recovery charge	Q _{rr}		-	83	-	nC	
Reverse recovery current	I _{RRM}		-	7	-	A	

TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

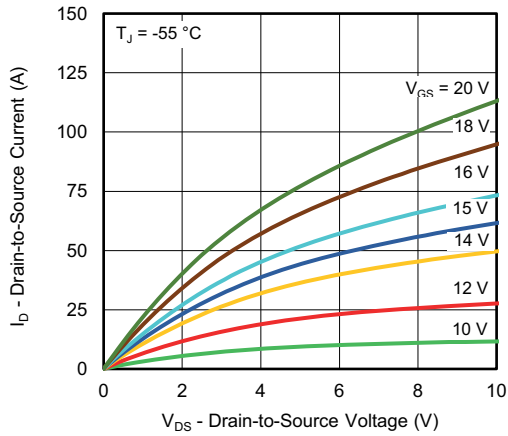


Fig. 1 - Typical Output Characteristics

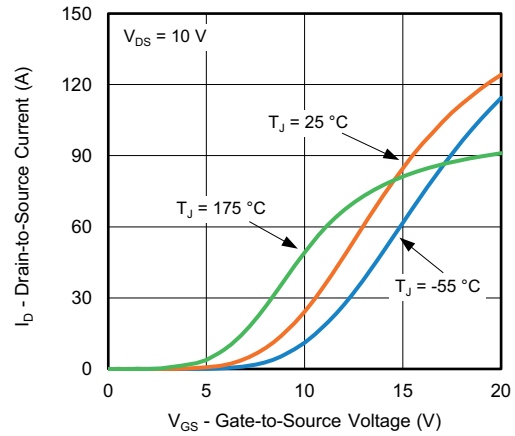


Fig. 4 - Typical Transfer Characteristics

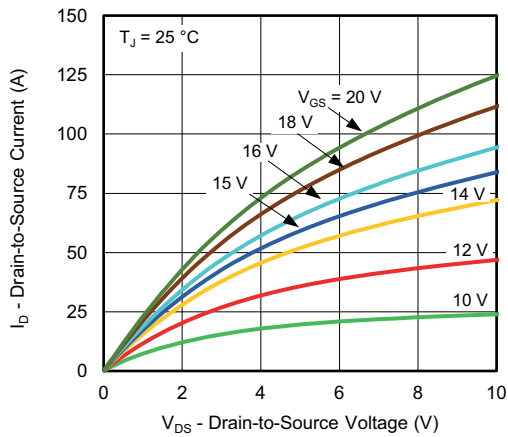


Fig. 2 - Typical Output Characteristics

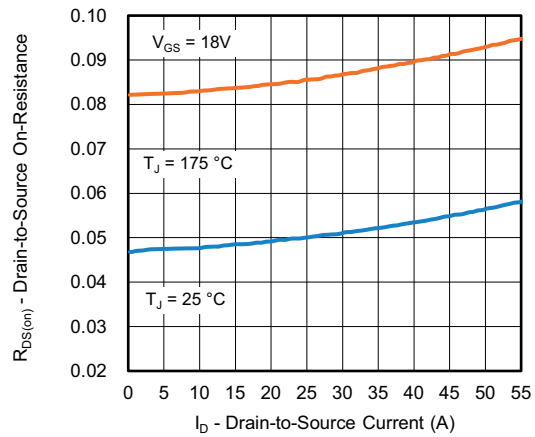


Fig. 5 - Normalized On-Resistance vs. Drain Current

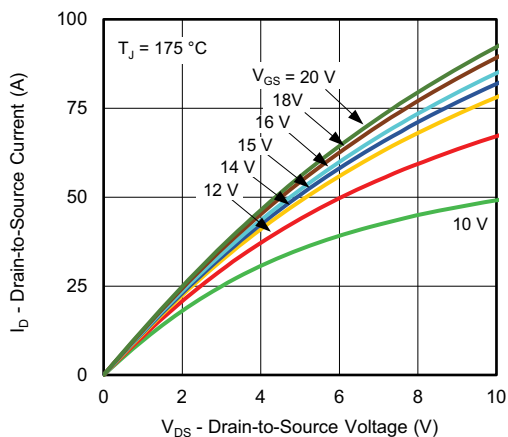


Fig. 3 - Typical Output Characteristics

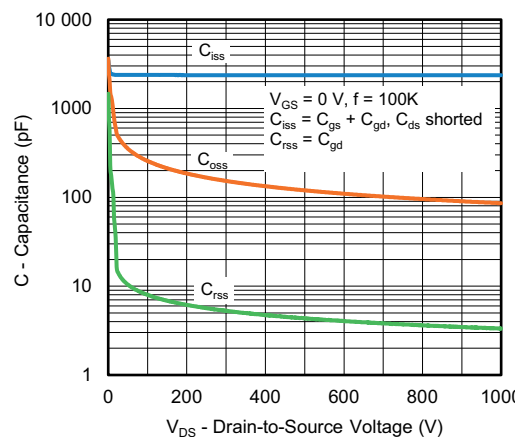


Fig. 6 - Typical Capacitance vs. Drain-to-Source Voltage

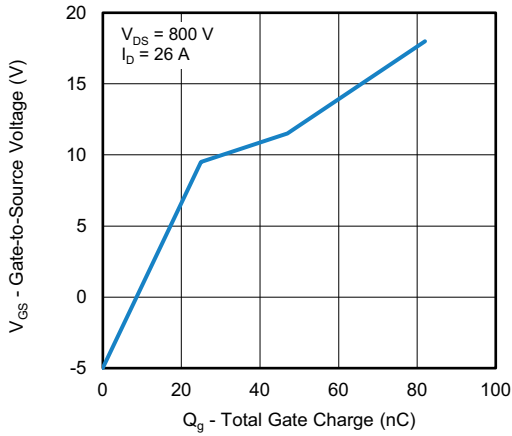


Fig. 7 - Typical Gate Charge vs. Gate-to-Source Voltage

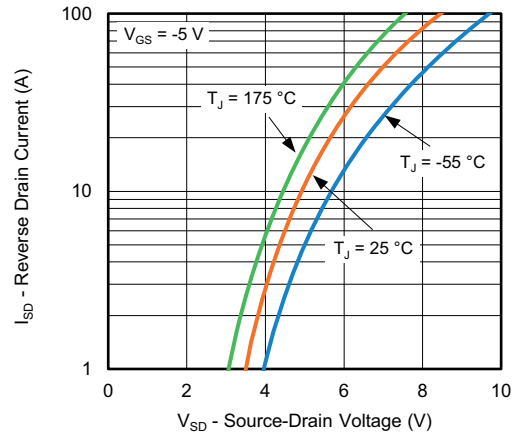


Fig. 10 - Typical Source-Drain Diode Forward Voltage

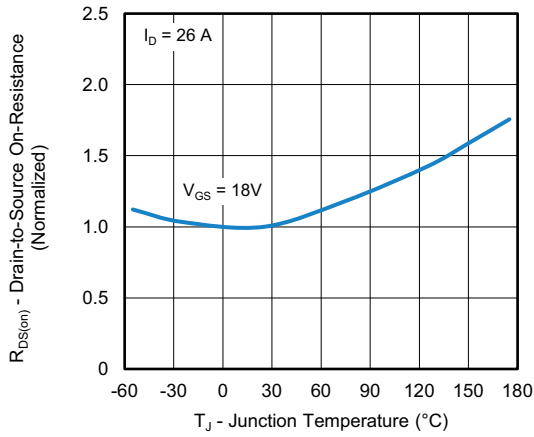


Fig. 8 - Normalized On-Resistance vs. Temperature

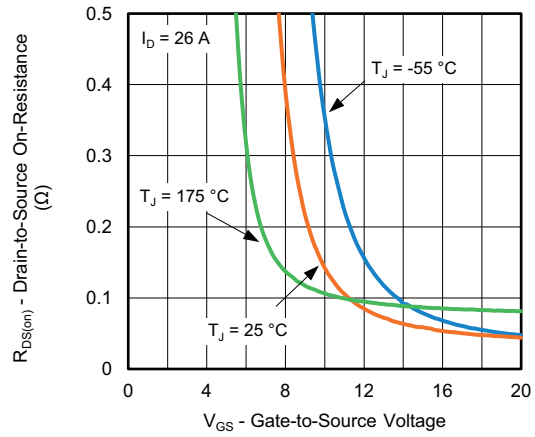


Fig. 11 - On-Resistance vs. Gate-to-Source Voltage

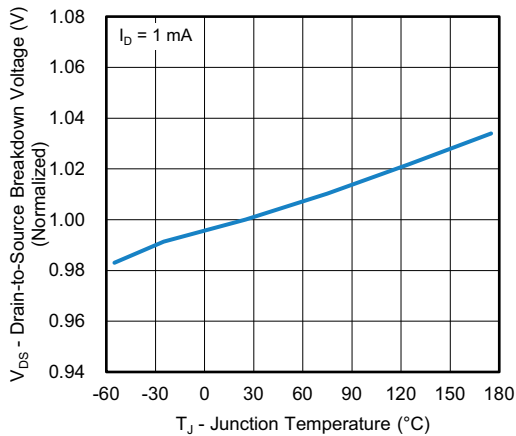


Fig. 9 - Drain-to-Source Voltage vs. Temperature

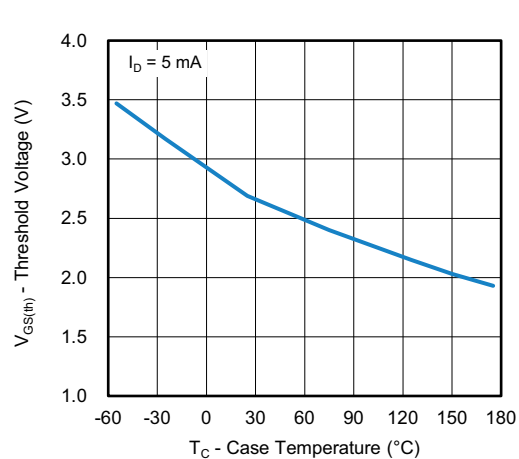


Fig. 12 - Threshold Voltage vs. Case Temperature

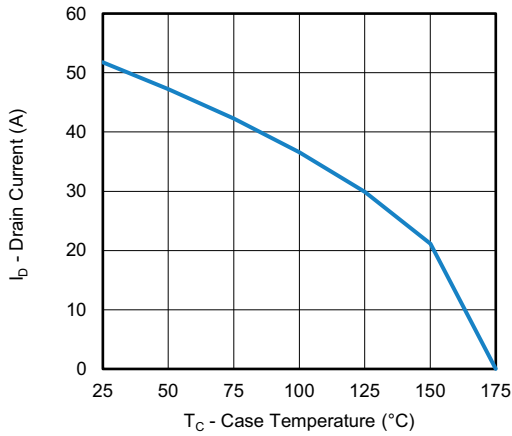


Fig. 13 - Drain Current vs. Case Temperature

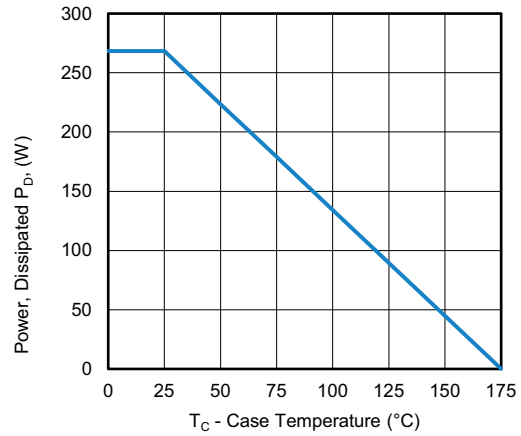


Fig. 15 - Power, Dissipated P_D vs. Case Temperature

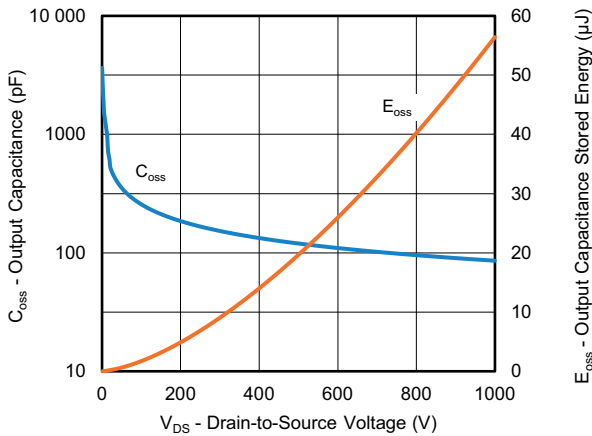


Fig. 14 - Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

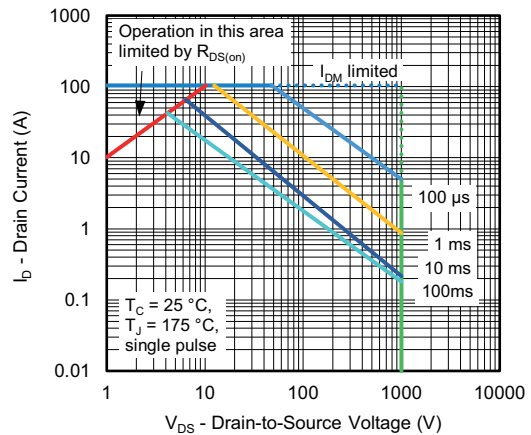


Fig. 16 - Safe Operating Area

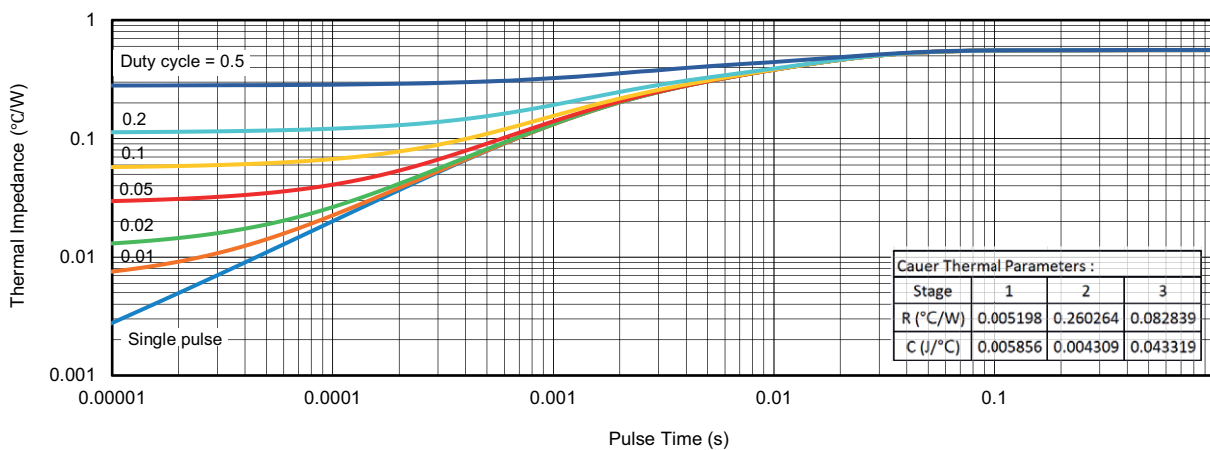


Fig. 17 - Transient Thermal Impedance

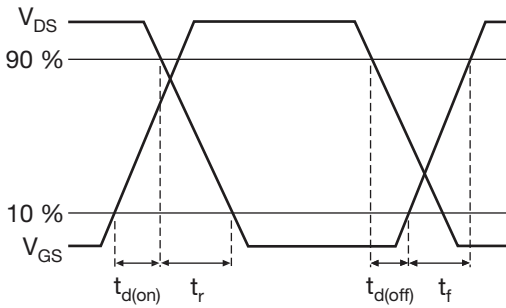


Fig. 18 - Waveforms of Switching Time

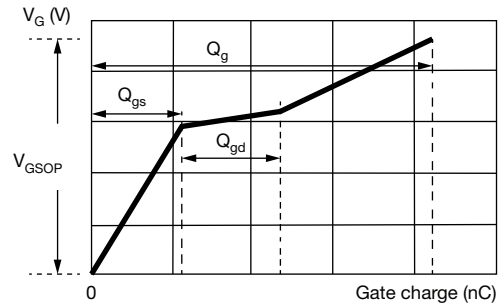


Fig. 21 - Waveforms for Gate Charge

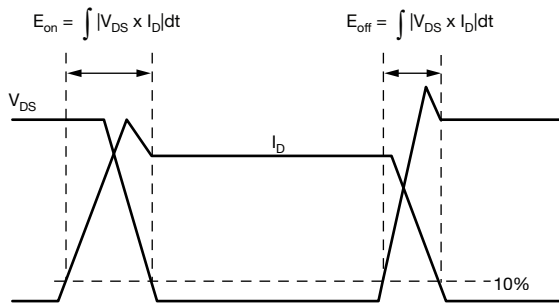


Fig. 19 - Waveforms for Switching Energy

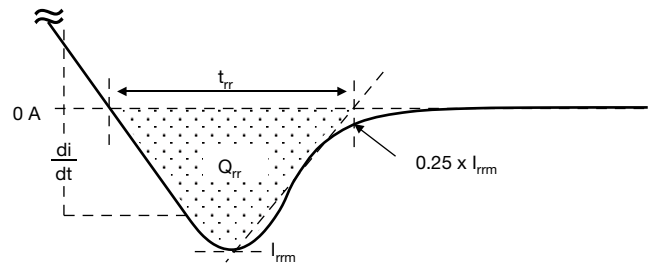


Fig. 22 - Waveforms for Reverse Recovery

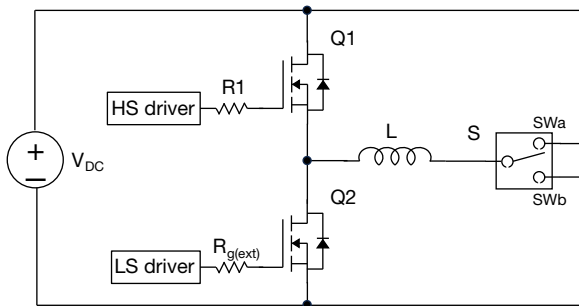


Fig. 20 - Switching and Reverse Diode Characteristics Measurement Circuit

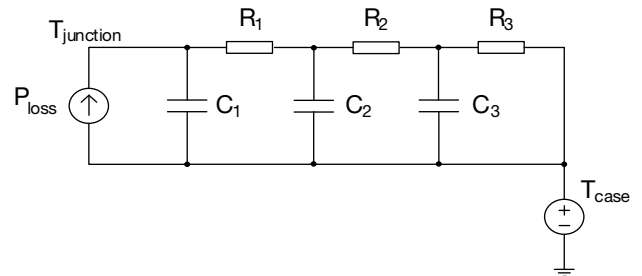
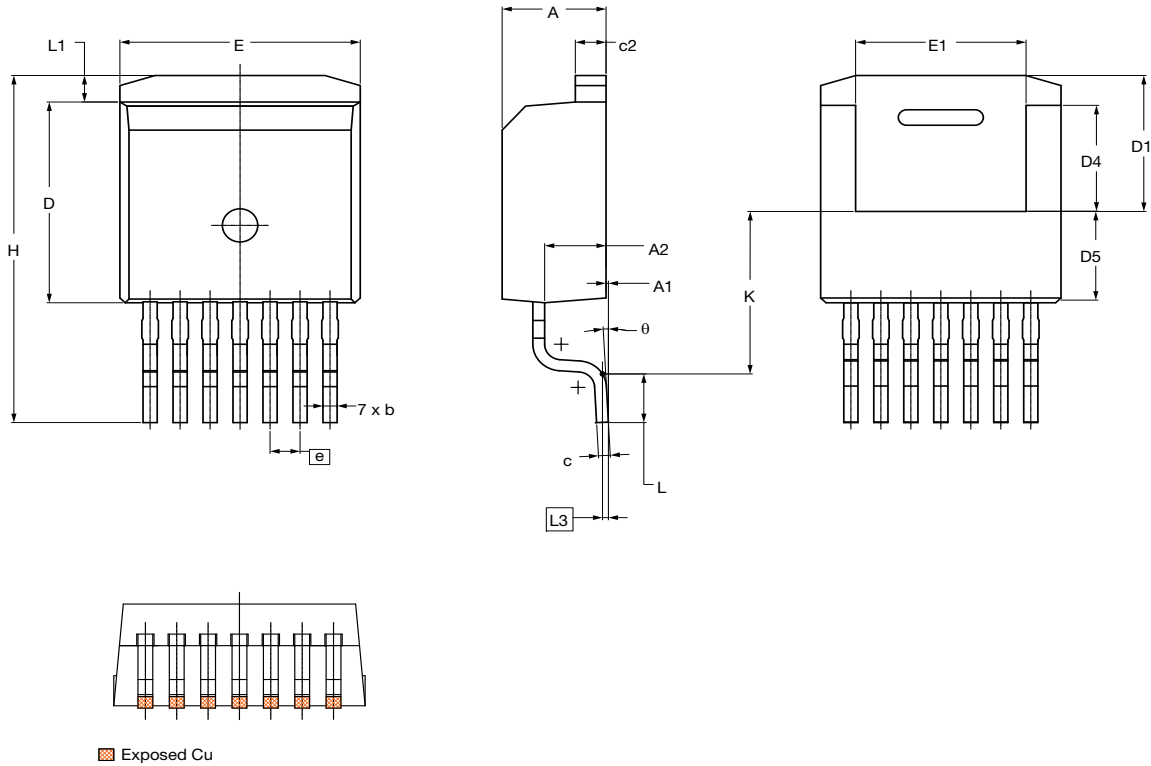


Fig. 23 - Thermal Equivalent Circuit

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Case Outline for TO-263 7L Package

FACILITY CODE: 9



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	4.30	4.40	4.50
A1	0.00	0.10	0.25
A2	2.45	2.60	2.75
b	0.50	0.60	0.70
c	0.45	0.50	0.60
c2	1.20	1.30	1.40
D	8.93	9.08	9.23
D1	6.15 ref.		
D4	4.65	4.80	4.95
D5	3.83	4.13	4.43
E	10.08	10.18	10.28
E1	6.82	7.22	7.62
e	1.27 BSC.		
H	15.00	15.70	16.00
K	7.30		
L	1.90	2.20	2.50
L1	1.00	1.20	1.40
L3	0.25 BSC.		
θ	0 °	3 °	7 °

ECN: S25-0851-Rev. C, 18-Jul-2025
DWG: 6119

Notes

- All dimensions are in mm and angles are in degrees
- Dimension D and E do not include mold flash. These dimensions are measured at the outermost extreme of the plastic body
- Thermal pad contour optional within Dimensions E, L1, D4 and E1
- Dimension D4 and E1 establish a minimum mounting surface for the thermal pad
- There is exposed Cu and molding flash bleeding at the pin which is close to package



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