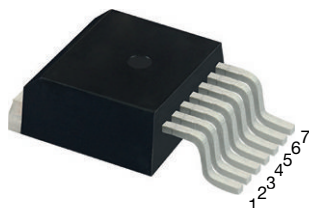
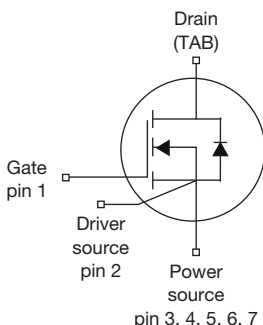


MaxSiC™ 1200 V N-Channel SiC MOSFET

D²PAK 7L (TO-263 7L)


Top View


Marking Code: 120A045FE

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

- Charger
- Boost inverter
- DC/DC converter

PRODUCT SUMMARY

V_{DS} (V) at T_J max.	1200	
$R_{DS(on)}$ typ. ($m\Omega$) at 25 °C	$V_{GS} = 20$ V	45
Q_g typ. (nC)	75.6	
I_D (A)	49	
C_{oss} typ. (pF)	90	
P_D (W)	212	
Configuration	Single	

ORDERING INFORMATION

Package	D ² PAK 7L (TO-263 7L)
Lead (Pb)-free and halogen-free	MXP120A045FE-T1GE3

ABSOLUTE MAXIMUM RATINGS ($T_C = 25$ °C, unless otherwise noted)

PARAMETER		SYMBOL	LIMIT	UNIT
Drain-source voltage ^a		V _{DS}	1200	V
Gate-source voltage		V _{GS}	-10 / +22	
Recommended operation voltage of gate-source		V _{GSOP}	-5 / +20	
Continuous drain current	T _C = 25 °C	I _D	49	A
Continuous drain current	T _C = 100 °C	I _D	31	
Pulsed drain current ^b		I _{DM}	98	
Short-circuit withstand time ^c		T _{SC}	3	μs
Maximum power dissipation	T _C = 25 °C	P _D	212	W
	T _C = 100 °C	P _D	85	
Operating junction and storage temperature range		T _J , T _{stg}	-55 to +150	°C
Soldering recommendations (peak temperature)	For 10 s		260	°C

Notes

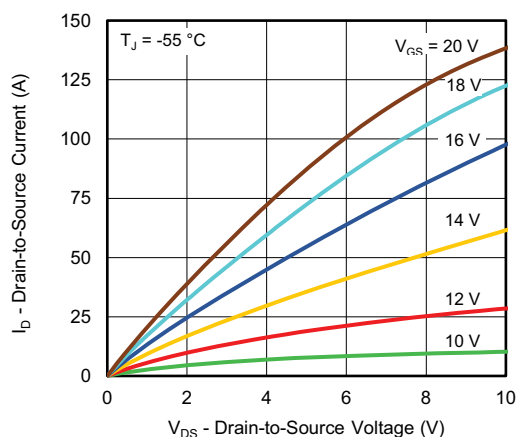
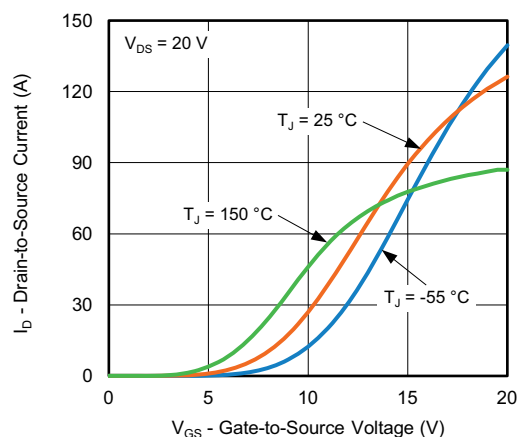
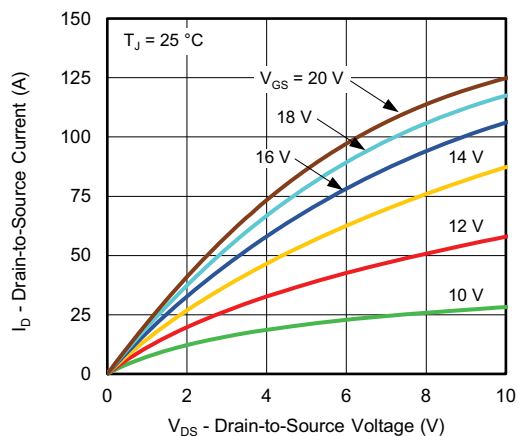
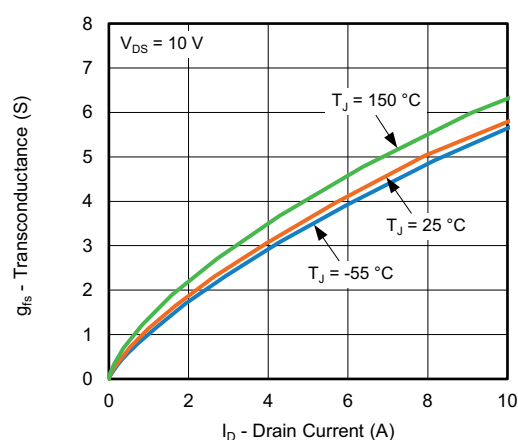
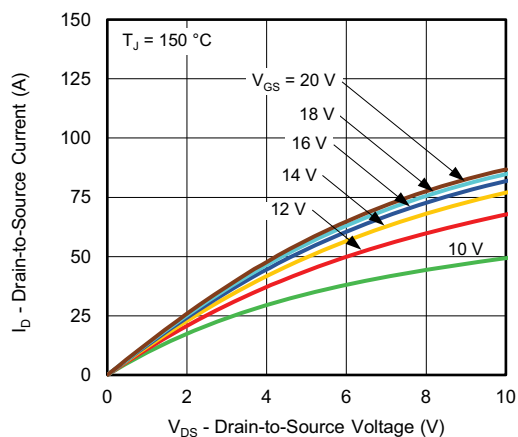
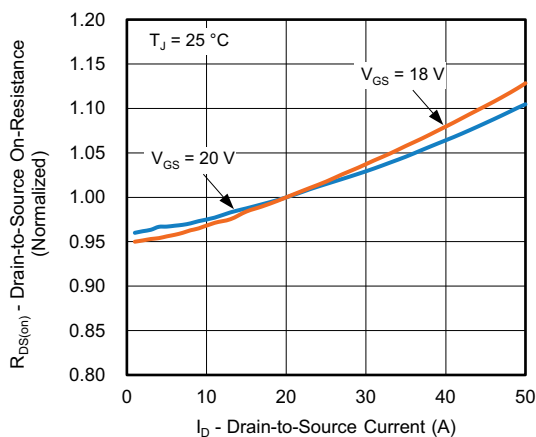
- $T_J = 25$ °C to 150 °C
- Repetitive rating; pulse width limited by maximum junction temperature
- Verified by the design / characterization

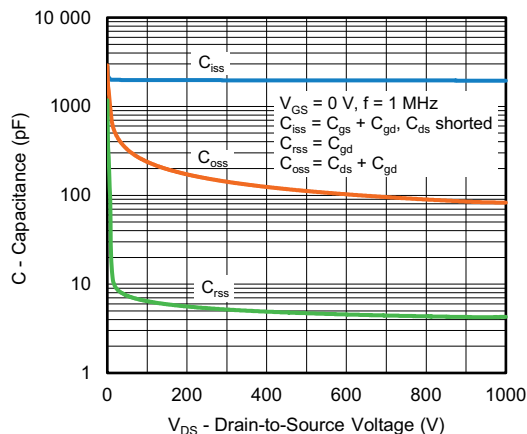
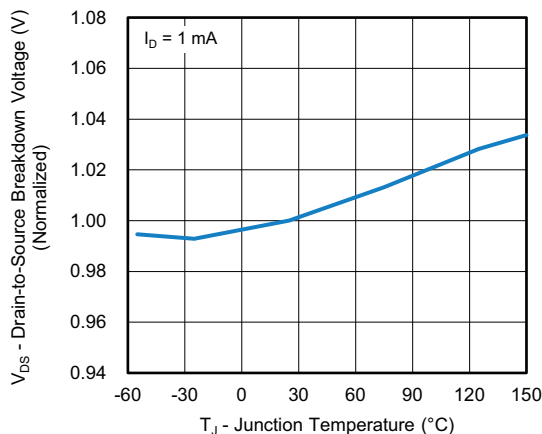
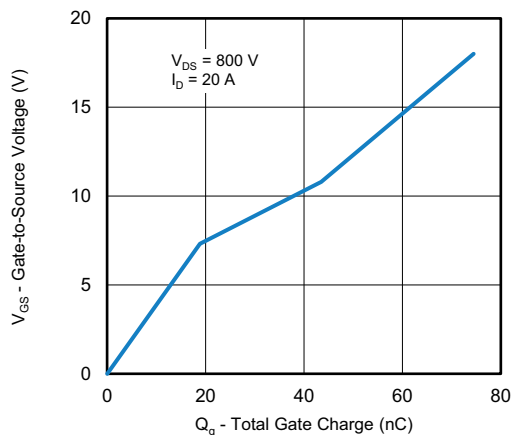
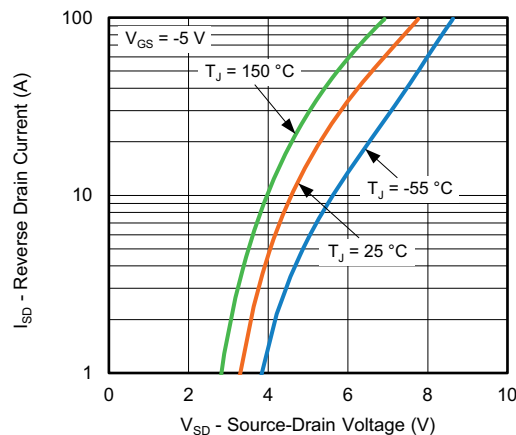
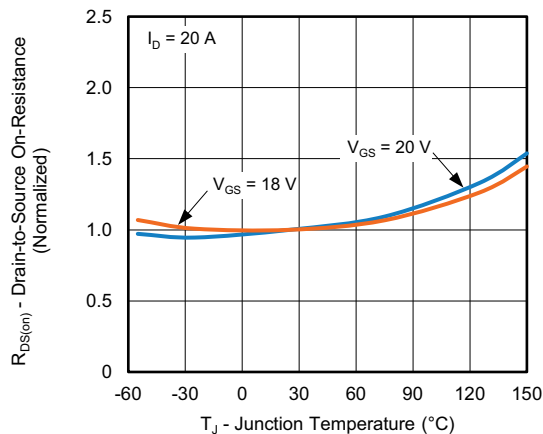
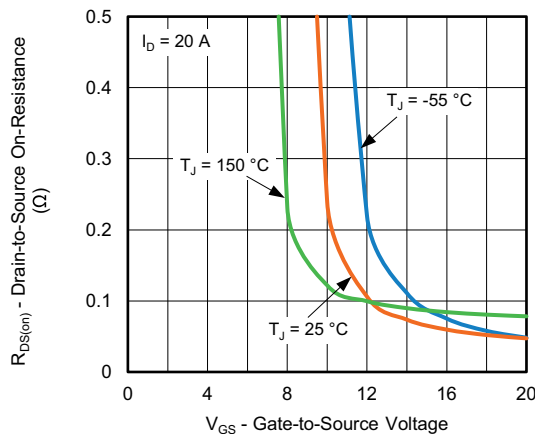
**THERMAL RESISTANCE RATINGS**

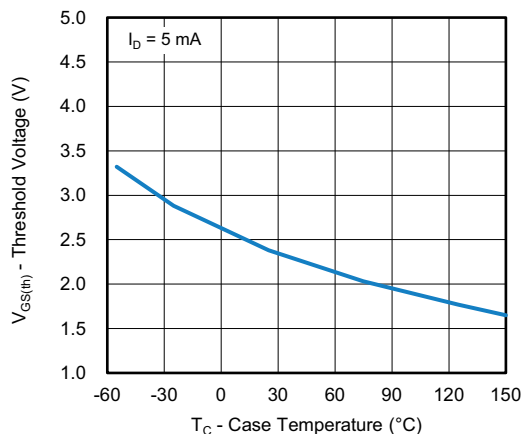
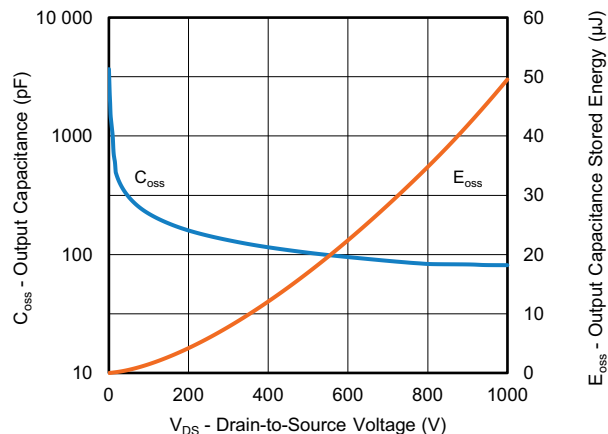
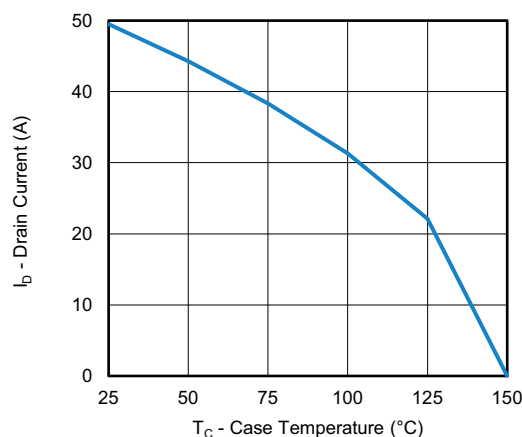
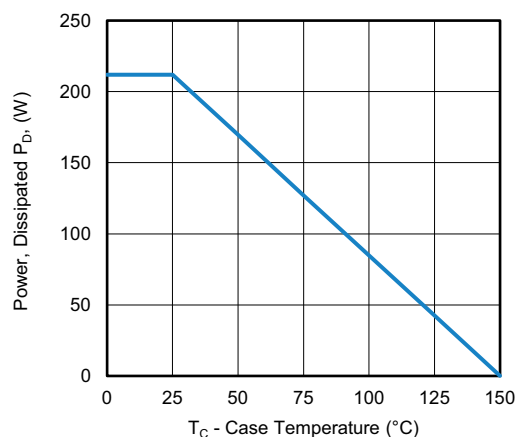
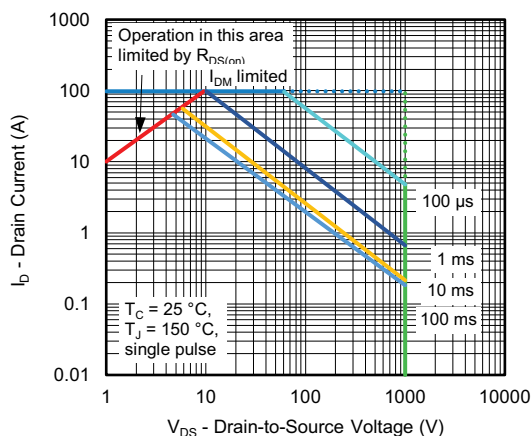
PARAMETER	SYMBOL	TYP.	MAX.	UNIT
Maximum junction-to-ambient	R_{thJA}	-	42	°C/W
Maximum junction-to-case (drain)	R_{thJC}	-	0.59	

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	1200	-	-	V
Gate-source threshold voltage (N)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = 5 mA	-	2.38	-	V
		V _{DS} = V _{GS} , I _D = 5 mA, T _J = 150 °C	-	1.65	-	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} = 960 V, V _{GS} = 0 V	-	-	10	μA
Drain-source on-state resistance	R _{DS(on)}	V _{GS} = 20 V, I _D = 20 A	-	45	56	mΩ
		V _{GS} = 20 V, I _D = 20 A, T _J = 150 °C	-	69	86	mΩ
		V _{GS} = 18 V, I _D = 20 A	-	55	69	
		V _{GS} = 18 V, I _D = 20 A, T _J = 150 °C	-	80	99	
Dynamic						
Input capacitance	C _{iss}	V _{GS} = 0 V, V _{DS} = 800 V, f = 1 MHz	-	1958	-	pF
Output capacitance	C _{oss}		-	90	-	
Reverse transfer capacitance	C _{rss}		-	4	-	
Cross stored energy	E _{oss}		-	35	-	μJ
Total gate charge	Q _g	V _{GS} = 18 V, I _D = 20 A, V _{DS} = 800 V	-	75.6	-	nC
Gate-source charge	Q _{gs}		-	19.5	-	
Gate-drain charge	Q _{gd}		-	26.2	-	
Gate Resistance	R _g	V _{DS} = 0 V, f = 1 MHz	-	4.9	-	Ω
Switching Characteristics						
Turn-on delay time	t _{d(on)}	V _{GS} = -5 V ~ 18 V, I _D = 20 A, V _{DS} = 800 V, R _{g(ext)} = 4.4 Ω	-	19	-	ns
Rise time	t _r		-	12	-	
Turn-off delay time	t _{d(off)}		-	22	-	
Fall time	t _f		-	11	-	
Turn-on switching energy	E _{on}		-	291	-	μJ
Turn-off switching energy	E _{off}		-	34	-	
Body Diode Ratings and Characteristic						
Forward diode voltage	V _{SD}	V _{GS} = -5 V, I _{SD} = 10 A, T _J = 25 °C	-	4.7	-	V
Continuous diode forward current	I _{SD}	V _{GS} = -5 V, T _J = 25 °C	-	-	32	A
Pulsed diode forward current	I _{SDM}		-	-	98	
Reverse recovery time	t _{rr}	V _{GS} = -5 V, I _{SD} = 20 A, V _R = 800 V, di/dt = 1000 A/μs	-	17	-	ns
Reverse recovery charge	Q _{rr}		-	65	-	nC
Reverse recovery current	I _{rrm}		-	6.6	-	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 - Forward Transconductance vs. Drain Current

Fig. 3 - Typical Output Characteristics

Fig. 6 - Normalized On-Resistance vs. Drain Current


Fig. 7 - Typical Capacitance vs. Drain-to-Source Voltage

Fig. 10 - Drain-to-Source Voltage vs. Temperature

Fig. 8 - Typical Gate Charge vs. Gate-to-Source Voltage

Fig. 11 - Typical Source-Drain Diode Forward Voltage

Fig. 9 - Normalized On-Resistance vs. Temperature

Fig. 12 - On-Resistance vs. Gate-to-Source Voltage


Fig. 13 - Threshold Voltage vs. Case Temperature

Fig. 15 - Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

Fig. 14 - Drain Current vs. Case Temperature

Fig. 16 - Power, Dissipated P_D vs. Case Temperature

Fig. 17 - Safe Operating Area

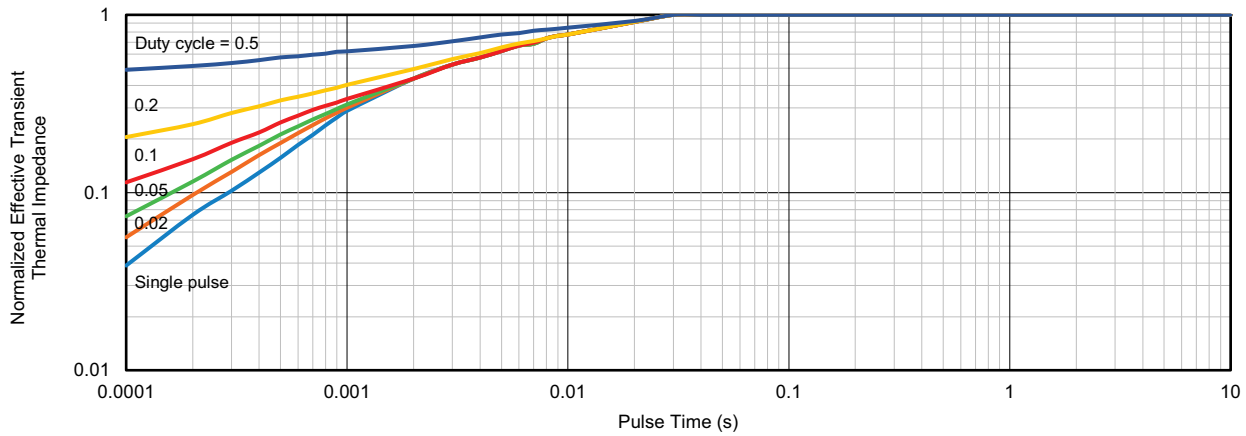


Fig. 18 - Normalized Effective Transient Thermal Impedance

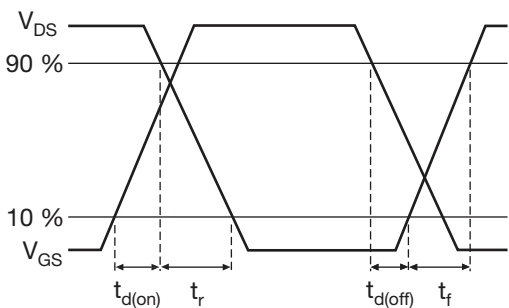


Fig. 19 - Waveforms of Switching Time

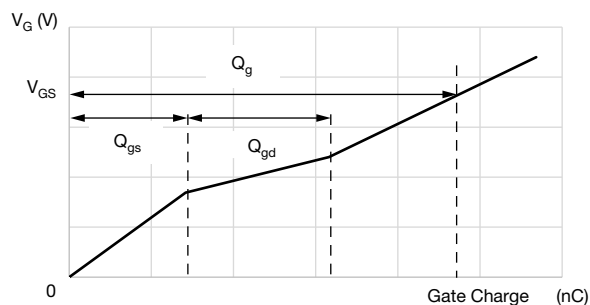


Fig. 22 - Waveforms for Gate Charge

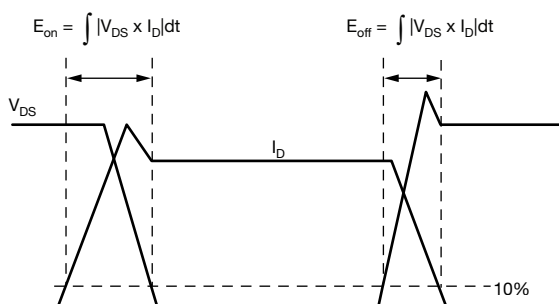


Fig. 20 - Waveforms for Switching Energy

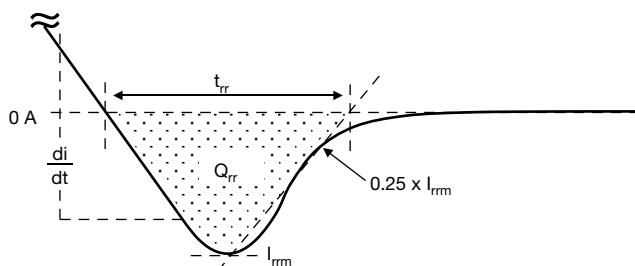


Fig. 23 - Waveforms for Reverse Recovery

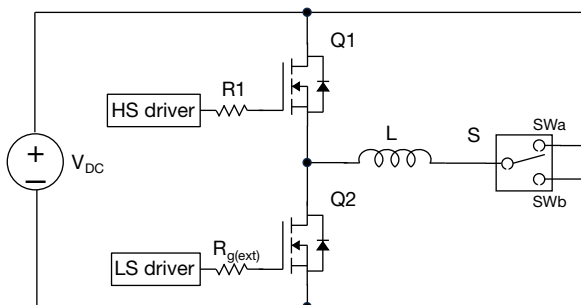
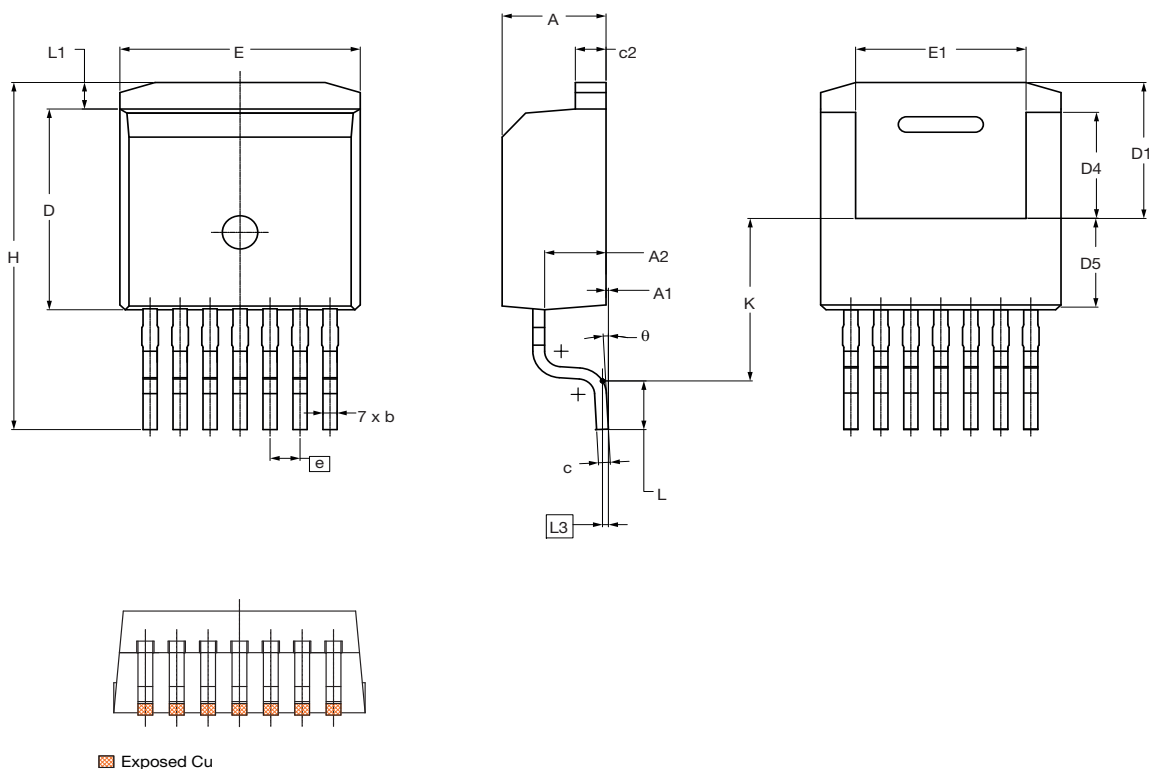


Fig. 21 - Switching and Reverse Diode Characteristics Measurement Circuit

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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: E24-0552-Rev. B, 28-Oct-2024
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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