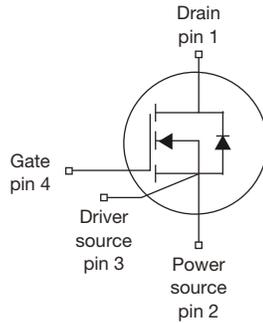
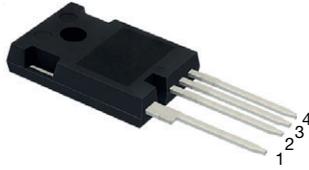


MaxSiC[®] 750 V N-Channel SiC MOSFET

TO-247AD 4L


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	$T_C = 25$ °C	I_D	51	A
Pulsed drain current ^a		I_{DM}	102	
Short-circuit withstand time ^b		T_{SC}	3	μ s
Maximum power dissipation	$T_C = 25$ °C	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

- Repetitive rating; pulse width limited by maximum junction temperature
- $V_{GS} = 18$ V, $V_{DS} = 400$ V, $R_{g(ext)} = 20$ Ω , verified by the design / characterization
- $T_J = 25$ °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)

AUTOMOTIVE GRADE


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 ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)							
PARAMETER	SYMBOL	TEST CONDITIONS	MIN.	TYP.	MAX.	UNIT	
Static							
Drain-source breakdown voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = 1\text{ mA}$	750	-	-	V	
Gate-source threshold voltage (N)	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = 10\text{ mA}$	-	2.65	-	V	
		$V_{DS} = V_{GS}, I_D = 10\text{ mA}, T_J = 175\text{ }^\circ\text{C}$	-	1.8	-	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}	$V_{DS} = 750\text{ V}, V_{GS} = 0\text{ V}$	-	-	10	μA	
Drain-source on-state resistance	$R_{DS(on)}$	$V_{GS} = 15\text{ V}, I_D = 24\text{ A}$	-	49	61	m Ω	
		$V_{GS} = 18\text{ V}, I_D = 24\text{ A}$	-	40	50		
		$V_{GS} = 18\text{ V}, I_D = 24\text{ A}, T_J = 175\text{ }^\circ\text{C}$	-	64	-		
Transconductance	g_{fs}	$V_{DS} = 10\text{ V}, I_D = 24\text{ A}$	-	11	-	S	
Dynamic							
Input capacitance	C_{iss}	$V_{GS} = 0\text{ V}, V_{DS} = 400\text{ V}, f = 100\text{ KHz}$	-	2245	-	pF	
Output capacitance	C_{oss}		-	124	-		
Reverse transfer capacitance	C_{rss}		-	4	-		
Total gate charge	Q_g	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 24\text{ A}, V_{DS} = 400\text{ V}$	-	77	-	nC	
Gate-source charge	Q_{gs}		-	17	-		
Gate-drain charge	Q_{gd}		-	18	-		
Gate Resistance	R_g		$V_{DS} = 0\text{ V}, f = 1\text{ MHz}$	-	2.4		-
Switching Characteristics							
Turn-on delay time	$t_{d(on)}$	$V_{GS} = -5\text{ V} \sim 18\text{ V}, I_D = 24\text{ A}, V_{DS} = 400\text{ V}, R_{g(ext)} = 4.4\text{ }\Omega$	$T_J = 25\text{ }^\circ\text{C}$	-	13	-	ns
			$T_J = 175\text{ }^\circ\text{C}$	-	12	-	
Rise time	t_r		$T_J = 25\text{ }^\circ\text{C}$	-	13	-	
			$T_J = 175\text{ }^\circ\text{C}$	-	12	-	
Turn-off delay time	$t_{d(off)}$		$T_J = 25\text{ }^\circ\text{C}$	-	23	-	
			$T_J = 175\text{ }^\circ\text{C}$	-	26	-	
Fall time	t_f		$T_J = 25\text{ }^\circ\text{C}$	-	6	-	
			$T_J = 175\text{ }^\circ\text{C}$	-	6	-	
Turn-on switching energy	E_{on}		$T_J = 25\text{ }^\circ\text{C}$	-	35	-	μJ
			$T_J = 175\text{ }^\circ\text{C}$	-	29	-	
Turn-off switching energy	E_{off}	$T_J = 25\text{ }^\circ\text{C}$	-	34	-		
		$T_J = 175\text{ }^\circ\text{C}$	-	33	-		
Body Diode Ratings and Characteristic							
Forward diode voltage	V_{SD}	$V_{GS} = -5\text{ V}, I_{SD} = 12\text{ A}, T_J = 25\text{ }^\circ\text{C}$	-	4.6	-	V	
Continuous diode forward current	I_{SD}	$V_{GS} = -5\text{ V}, T_J = 25\text{ }^\circ\text{C}$	-	-	32	A	
Pulsed diode forward current	I_{SDM}		-	-	102		
Reverse recovery time	t_{rr}	$V_{GS} = -5\text{ V}, I_{SD} = 24\text{ A}, V_R = 400\text{ V}, di/dt = 1000\text{ A}/\mu\text{s}$	-	17	-	ns	
Reverse recovery charge	Q_{rr}		-	67	-	nC	
Reverse recovery current	I_{RRM}		-	7	-	A	

Note

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



TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)

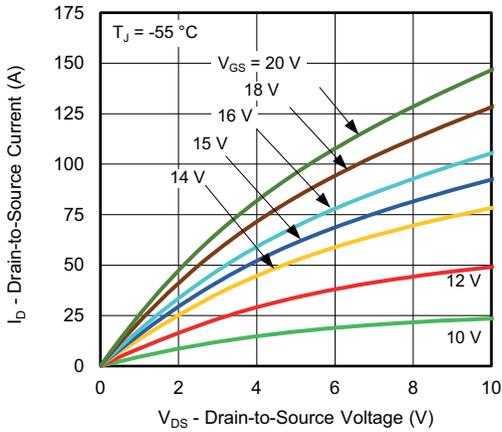


Fig. 1 Typical Output Characteristics

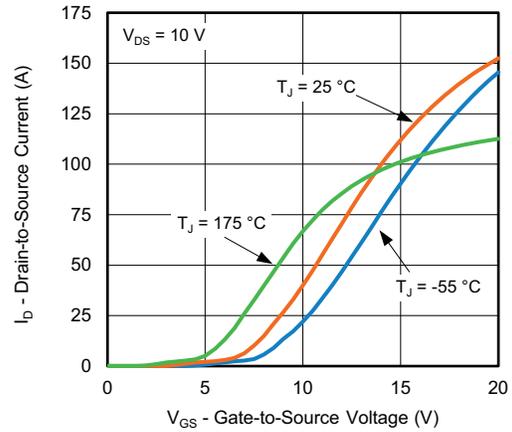


Fig. 4 Typical Transfer Characteristics

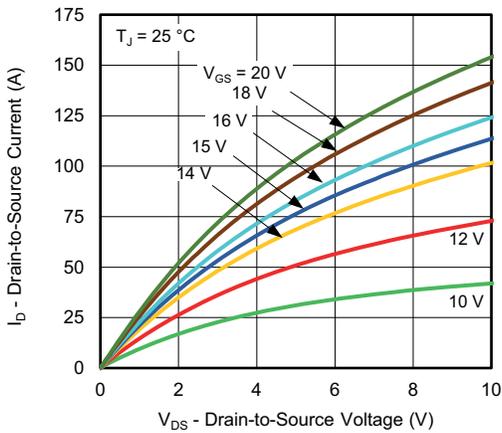


Fig. 2 Typical Output Characteristics

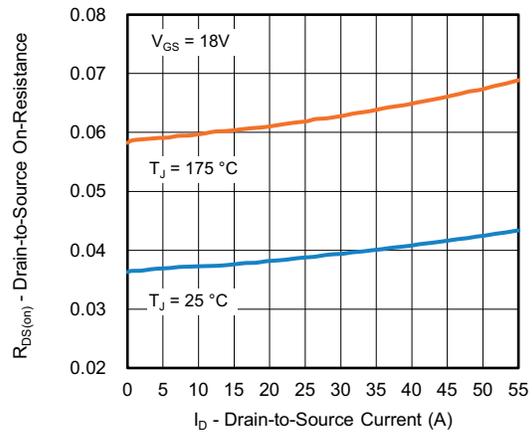


Fig. 5 Normalized On-Resistance vs. Drain Current

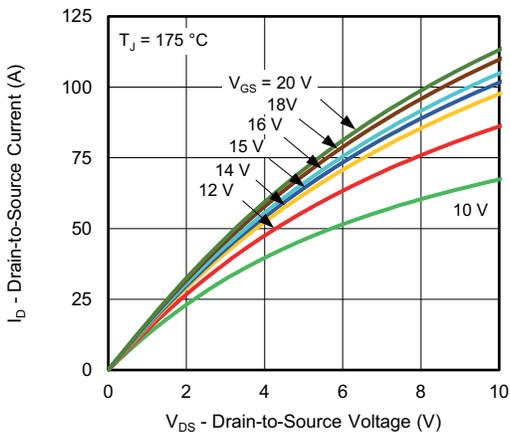


Fig. 3 Typical Output Characteristics

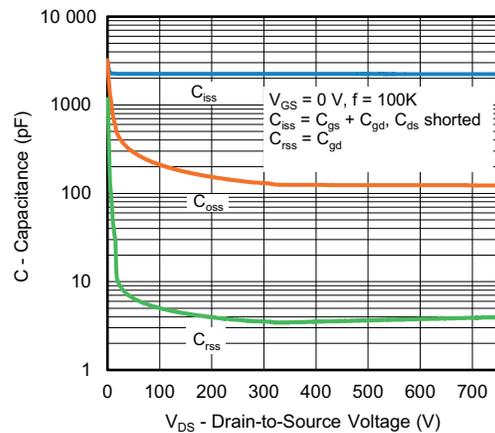


Fig. 6 Typical Capacitance vs. Drain-to-Source Voltage

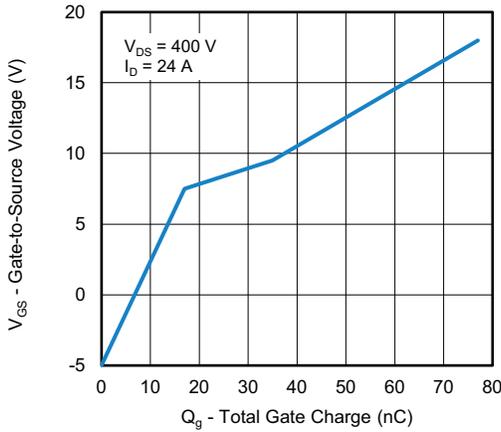


Fig. 7 Typical Gate Charge vs. Gate-to-Source Voltage

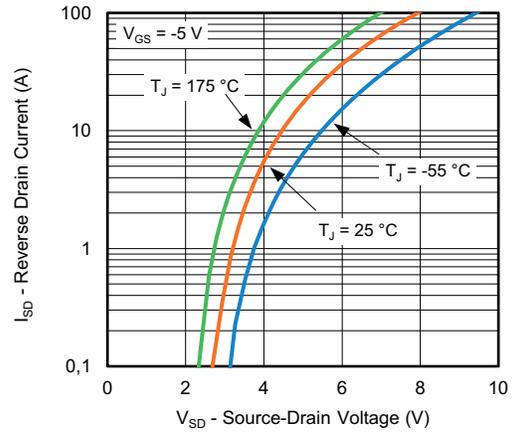


Fig. 10 Typical Source-Drain Diode Forward Voltage

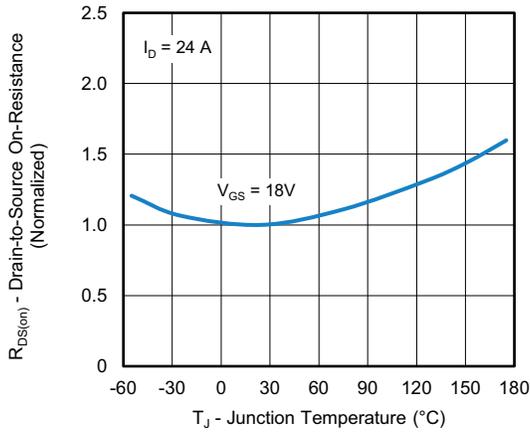


Fig. 8 Normalized On-Resistance vs. Temperature

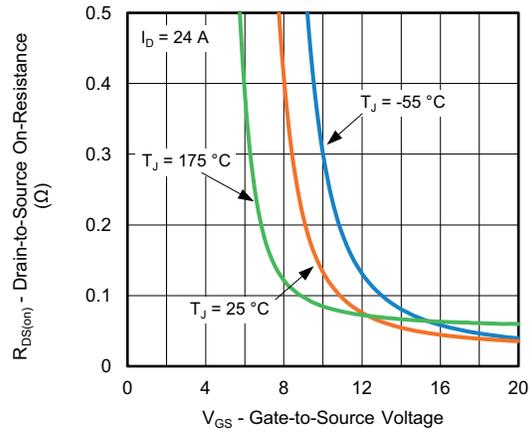


Fig. 11 On-Resistance vs. Gate-to-Source Voltage

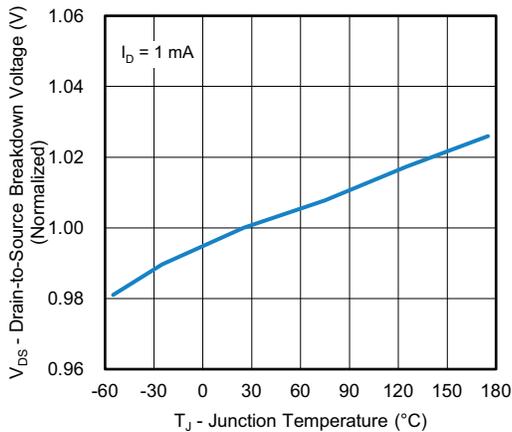


Fig. 9 Drain-to-Source Voltage vs. Temperature

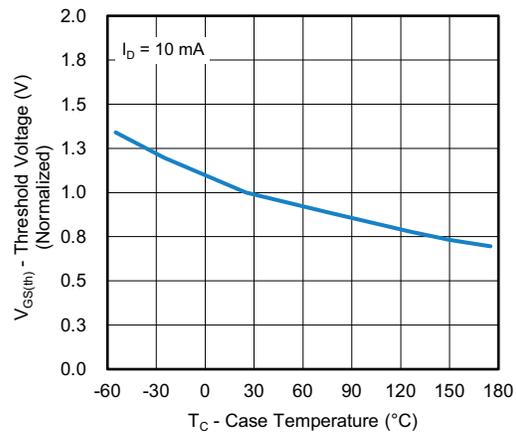


Fig. 12 Threshold Voltage vs. Case Temperature

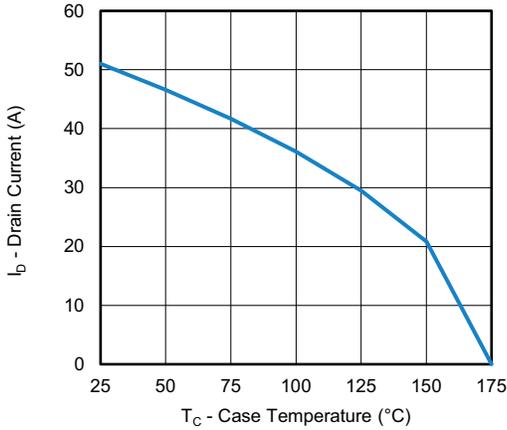


Fig. 13 Drain Current vs. Case Temperature

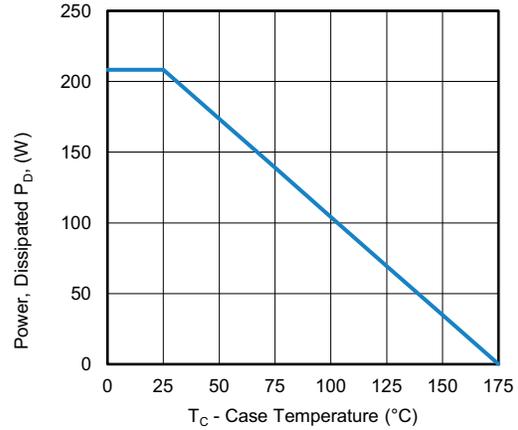


Fig. 15 Power, Dissipated P_D vs. Case Temperature

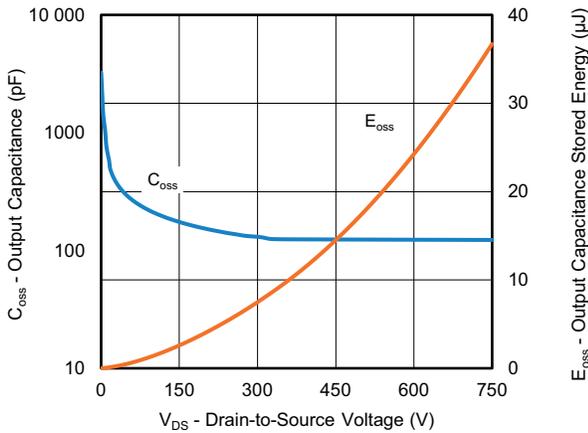


Fig. 14 Output Capacitance and its Stored Energy vs. Drain-to-Source Voltage

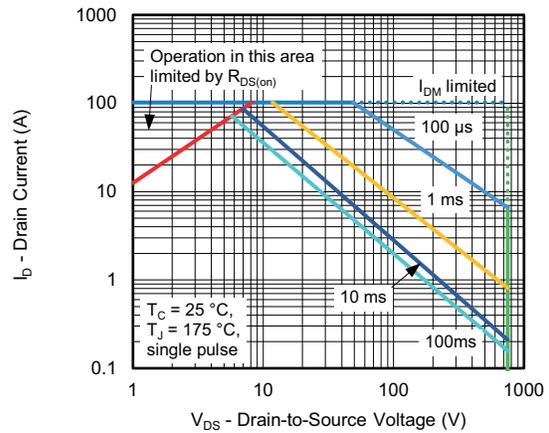


Fig. 16 Safe Operating Area

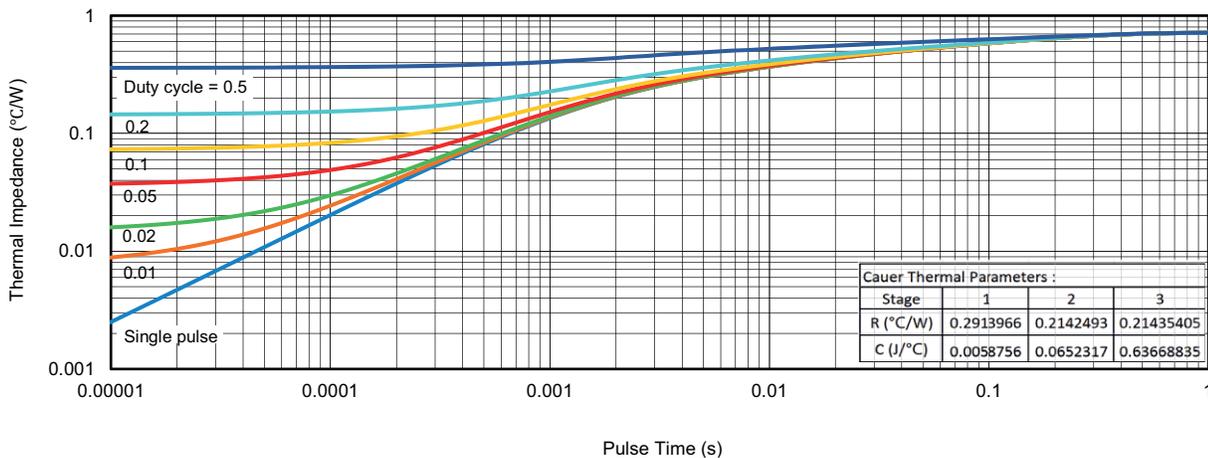


Fig. 17 Transient Thermal Impedance

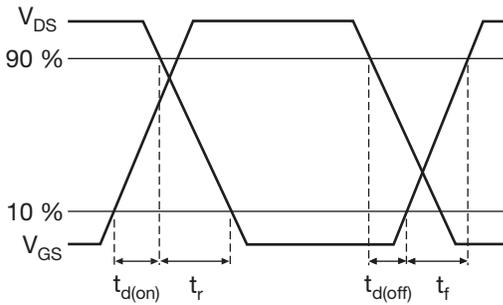


Fig. 18 Waveforms of Switching Time

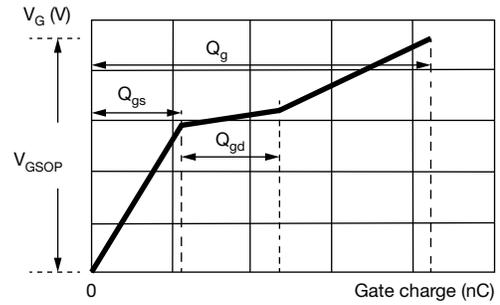


Fig. 21 Waveforms for Gate Charge

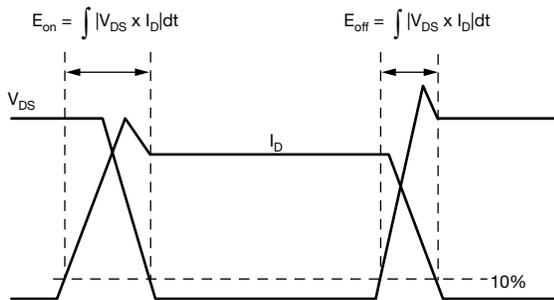


Fig. 19 Waveforms for Switching Energy

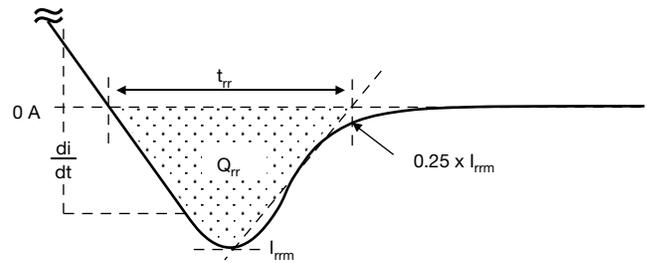


Fig. 22 Waveforms for Reverse Recovery

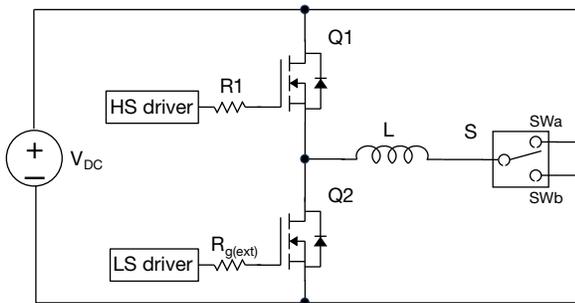


Fig. 20 Switching and Reverse Diode Characteristics Measurement Circuit

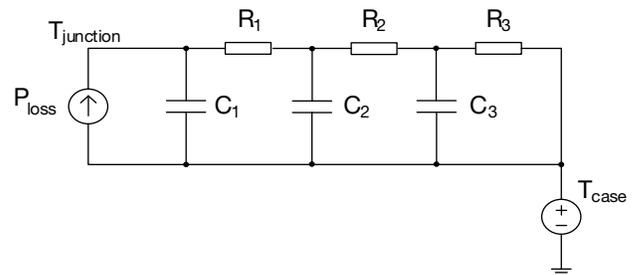


Fig. 23 Thermal Equivalent Circuit

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