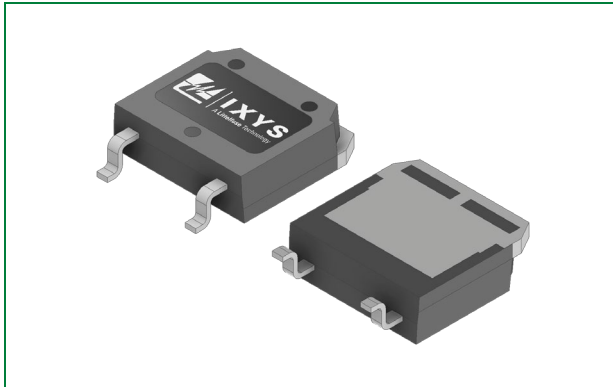


LSIC1MO170H0750
1700 V, 750 mOhm N-Channel SiC MOSFET

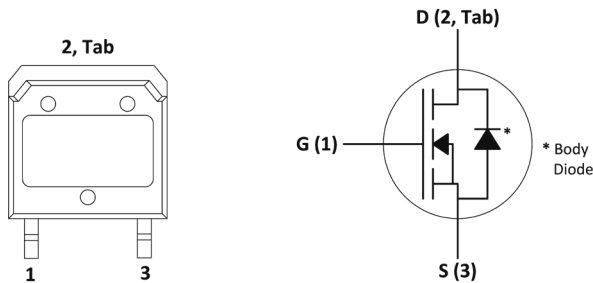


Agency Approvals and Environmental

Environmental Approvals



Pinout Diagram



Product Summary

Characteristic	Value	Unit
V_{DS}	1700	V
Typical $R_{DS(ON)}$	750	m Ω
I_D ($T_C \leq 100\text{ }^\circ\text{C}$)	4.4	A

Features

- MSL 1 Rated
- Optimized for high-frequency, high-efficiency applications
- Extremely low gate charge and output capacitance
- Low gate resistance for high-frequency switching
- Normally-off operations at all temperatures
- Ultra-low on-resistance
- RoHS compliant, lead-free, and halogen-free
- True 2L package offers enhanced creepage and clearance

Applications

- Auxiliary power supply
- High-frequency applications
- Solar Inverters
- Switch Mode Power Supplies
- UPS
- Motor Drives
- High Voltage DC/DC Converters
- Battery Chargers
- Induction Heating

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1. Maximum Ratings

Characteristic	Symbol	Conditions	Value	Unit
Drain-Source Voltage	V_{DS}	$V_{GS} = 0\text{ V}$	1700	V
Continuous Drain Current	I_D	$V_{GS} = 20\text{ V}, T_c = 25\text{ }^\circ\text{C}$	6.2	A
		$V_{GS} = 20\text{ V}, T_c = 100\text{ }^\circ\text{C}$	4.4	
Pulsed Drain Current ¹	$I_{D(pulse)}$	$T_c = 25\text{ }^\circ\text{C}$	11	A
Power Dissipation	P_D	$T_c = 25\text{ }^\circ\text{C}, T_J = 175\text{ }^\circ\text{C}$	60	W
Gate-Source Voltage	$V_{GS,MAX}$	Absolute maximum values – Steady state	-6 to +22	V
	$V_{GS,OP,TR}$ ²	Transient, $t_{transient} < 300\text{ nsec}$	-10 to +25	
	$V_{GS,OP}$ ³	Recommended DC operating values	-5 to +20	
Operating Junction Temperature	T_J	-	-55 to +175	$^\circ\text{C}$
Storage Temperature	T_{STG}	-	-55 to +150	$^\circ\text{C}$
Lead Temperature for Soldering (MSL 1 Rated)	T_{SOLD}	-	260	$^\circ\text{C}$
ESD Sensitivity Rating	HBM ESD	Maximum Withstand Voltage	250	V
	CDM ESD	Maximum Withstand Voltage	1000	

Footnote 1: Pulse width limited by $T_{J,MAX}$

Footnote 2: See Figure 21 for further information

Footnote 3: MOSFET can operate with $V_{GS(OFF)} = 0\text{ V}$ – dependent upon PCB layout. $V_{GS(OFF)} = -5\text{ V}$ provides added noise margin and faster turn-off speed

2. Thermal Characteristics

Characteristic	Symbol	Value	Unit
Maximum Thermal Resistance, junction-to-case	$R_{th,JC,MAX}$	2.5	$^\circ\text{C/W}$
Maximum Thermal Resistance, junction-to-ambient	$R_{th,JA,MAX}$	40	$^\circ\text{C/W}$

3. Electrical Characteristics

3.1. Static Characteristics ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Drain-Source Breakdown Voltage	$V_{IBRIDSS}$	$V_{GS} = 0\text{ V}, I_D = 100\text{ }\mu\text{A}$	1700	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = 1700\text{ V}, V_{GS} = 0\text{ V}$	-	<1	10	μA
		$V_{DS} = 1700\text{ V}, V_{GS} = 0\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	<1	-	
Gate Leakage Current	$I_{GSS,F}$	$V_{GS} = 22\text{ V}, V_{DS} = 0\text{ V}$	-	-	100	nA
	$I_{GSS,R}$	$V_{GS} = -6\text{ V}, V_{DS} = 0\text{ V}$	-	-	100	
Drain-Source On-State Resistance	$R_{DS(ON)}$	$I_D = 2\text{ A}, V_{GS} = 20\text{ V}$	-	750	1000	m Ω
		$I_D = 2\text{ A}, V_{GS} = 20\text{ V}, T_J = 175\text{ }^\circ\text{C}$	-	1550	-	
Gate Threshold Voltage	$V_{GS(TH)}$	$V_{DS} = V_{GS}, I_D = 1\text{ mA}$	1.8	2.8	4.0	V
		$V_{DS} = V_{GS}, I_D = 1\text{ mA}, T_J = 175\text{ }^\circ\text{C}$	-	1.9	-	
Gate Resistance	R_G	Resonance method, Drain-Source shorted ¹	-	29	-	Ω

Footnote 1: For a description of the resonance method for measuring R_G , refer to the JEDEC Standard JESD24-11 test method

3.2. Dynamic Characteristics ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Turn-On Switching Energy	E_{ON}	$V_{DD} = 1200\text{ V}$, $I_D = 2\text{ A}$, $V_{GS} = -5 / +20\text{ V}$, $R_{G,ext} = 2\ \Omega$, $L = 1.37\text{ mH}$, FWD = LSIC1MO170H0750	-	120	-	μJ
Turn-Off Switching Energy	E_{OFF}		-	40	-	
Total Per-Cycle Switching Energy	E_{TS}		-	160	-	
Input Capacitance	C_{ISS}	$V_{DD} = 1000\text{ V}$, $V_{GS} = 0\text{ V}$, $f = 1\text{ MHz}$, $V_{AC} = 25\text{ mV}$	-	200	-	pF
Output Capacitance	C_{OSS}		-	11.5	-	
Reverse Transfer Capacitance	C_{RSS}		-	1.7	-	
COSS Stored Energy	E_{OSS}		-	5.7	-	
Total Gate Charge	Q_g	$V_{DD} = 1200\text{ V}$, $I_D = 2\text{ A}$, $V_{GS} = -5 / +20\text{ V}$	-	13	-	nC
Gate-Source Charge	Q_{gs}		-	3.5	-	
Gate-Drain Charge	Q_{gd}		-	6.0	-	
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = 1200\text{ V}$, $V_{GS} = -5 / +20\text{ V}$, $I_D = 2\text{ A}$, $R_{G,ext} = 2\ \Omega$, $R_L = 600\ \Omega$, Timing relative to V_{DS}	-	10	-	ns
Rise Time	t_r		-	15.6	-	
Turn-Off Delay Time	$t_{d(off)}$		-	26	-	
Fall Time	t_f		-	128	-	

4. Reverse Diode Characteristics ($T_J = 25\text{ }^\circ\text{C}$ unless otherwise specified)

Characteristic	Symbol	Conditions	Value			Unit
			Min	Typ	Max	
Diode Forward Voltage	V_{SD}	$I_S = 1\text{ A}$, $V_{GS} = -5\text{ V}$	-	4.2	-	V
		$I_S = 1\text{ A}$, $V_{GS} = -5\text{ V}$, $T_J = 175\text{ }^\circ\text{C}$	-	3.6	-	
Continuous Diode Forward Current	I_S	$V_{GS} = -5\text{ V}$, $T_C = 25\text{ }^\circ\text{C}$	-	-	9	A
Peak Diode Forward Current ¹	I_{SP}		-	-	15	

Footnote 1: Pulse width limited by $T_{J,MAX}$

5. Figure Data

Figure 1. Maximum Power Dissipation ($T_J = 175\text{ }^\circ\text{C}$)

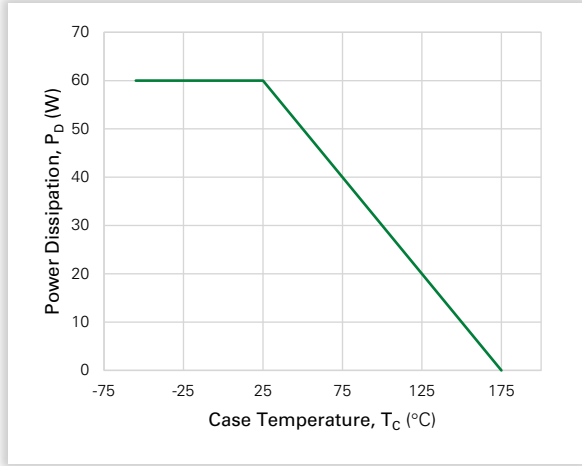


Figure 2. Typical Transfer Characteristics

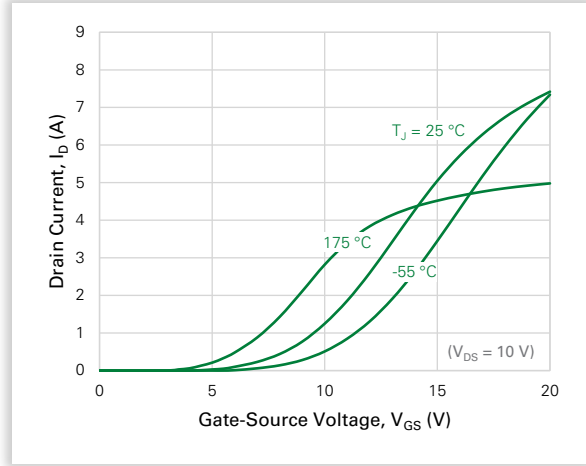


Figure 3. Typical Output Characteristics ($T_J = 25\text{ }^\circ\text{C}$)

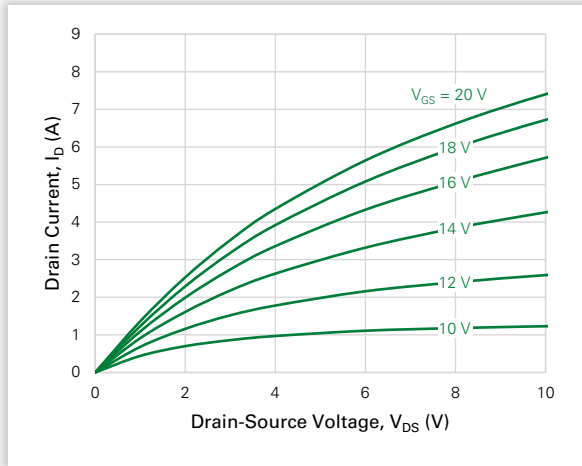


Figure 4. Typical Output Characteristics ($T_J = 175\text{ }^\circ\text{C}$)

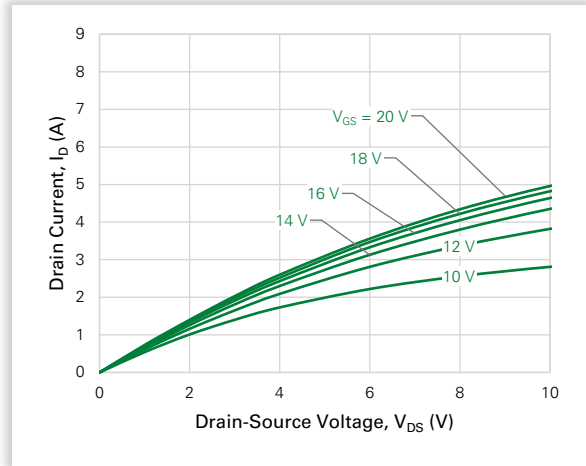


Figure 5. Typical Output Characteristics ($T_J = -55\text{ }^\circ\text{C}$)

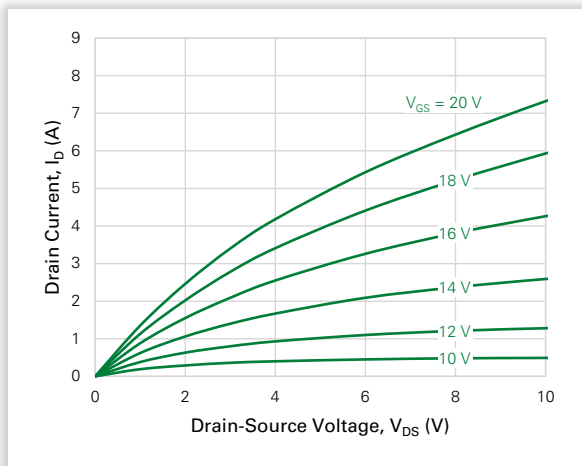


Figure 6. Typical Reverse Conduction Characteristics ($T_J = 25\text{ }^\circ\text{C}$)

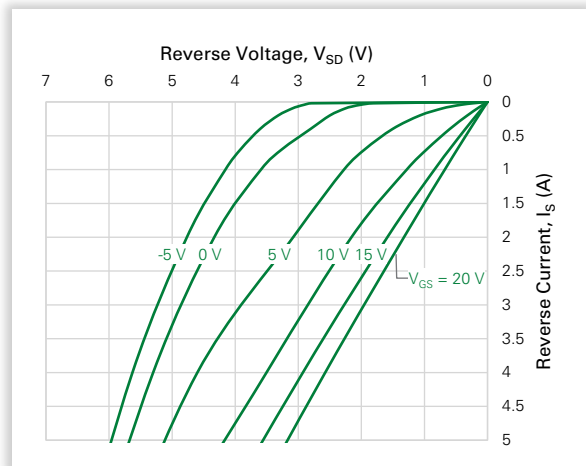


Figure 7. Typical Reverse Conduction Characteristics ($T_J = 175\text{ }^\circ\text{C}$)

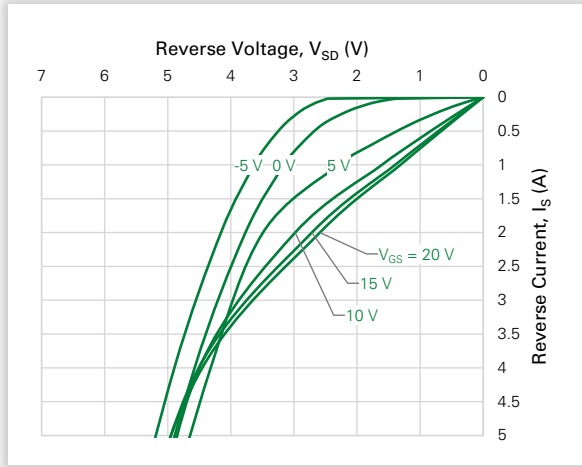


Figure 8. Typical Reverse Conduction Characteristics ($T_J = -55\text{ }^\circ\text{C}$)

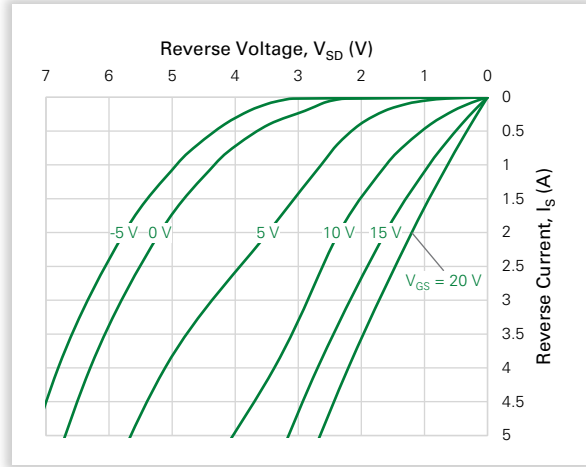


Figure 9. Transient Thermal Impedance

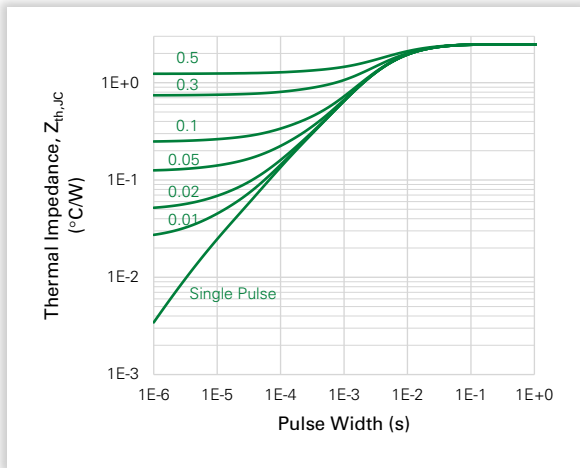


Figure 10. Maximum Safe Operating Area ($T_C = 25\text{ }^\circ\text{C}$)

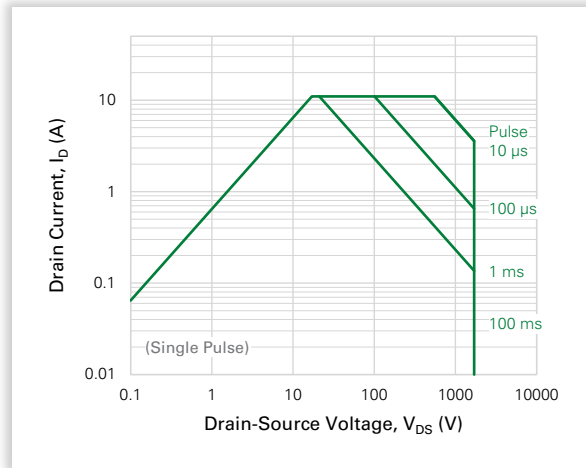


Figure 11. On-resistance vs. Drain Current

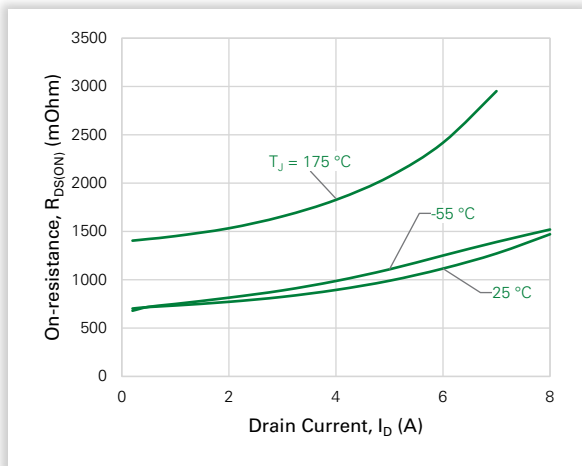


Figure 12. Normalized On-resistance vs. Junction Temperature

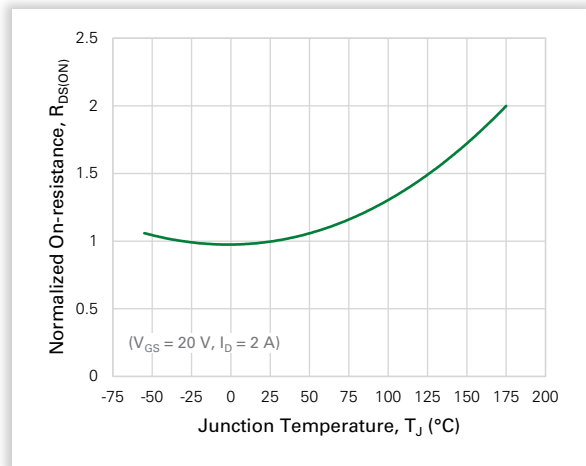


Figure 13. Typical On-resistance vs. Junction Temperature

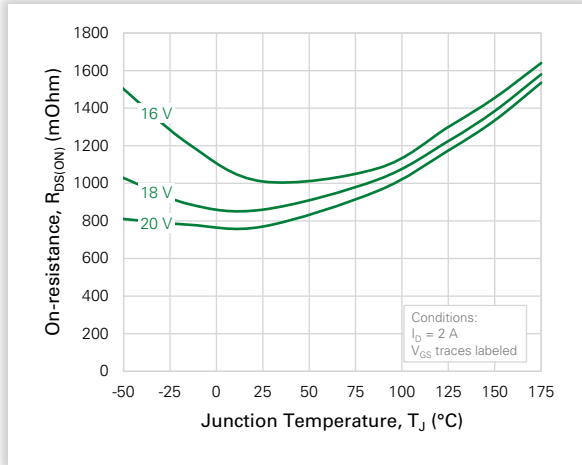


Figure 14. Typical Threshold Voltage

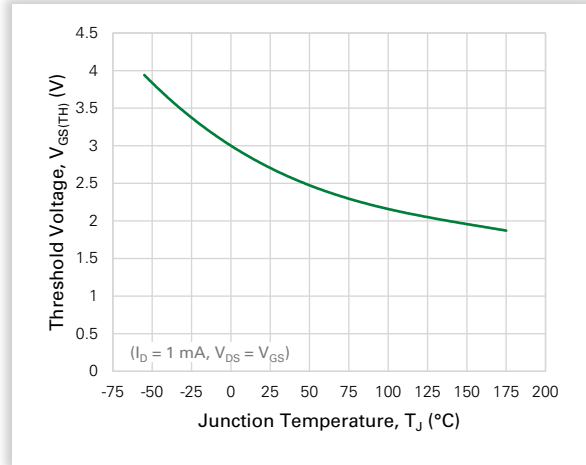


Figure 15. Typical Junction Capacitances up to 1000 V

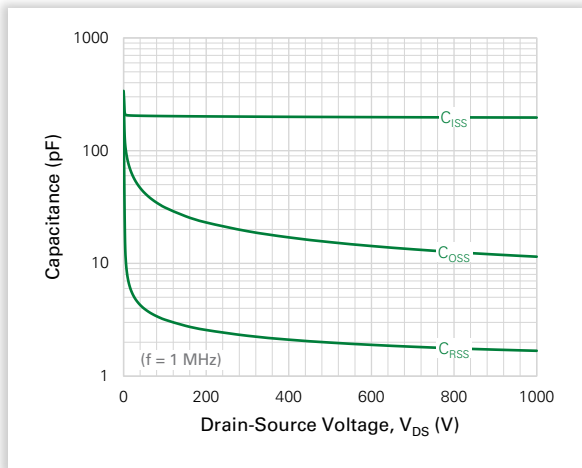


Figure 16. Typical Junction Capacitances up to 200 V

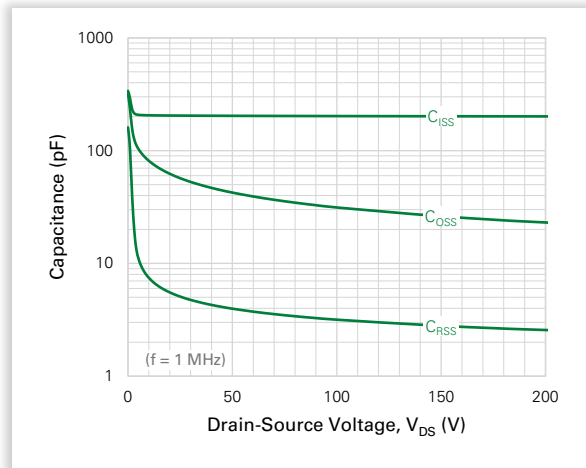


Figure 17. Typical C_{oss} Stored Energy E_{oss}

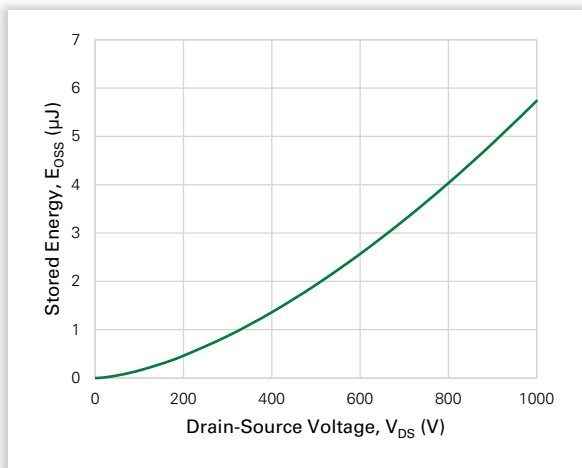


Figure 18. Typical Gate Charge

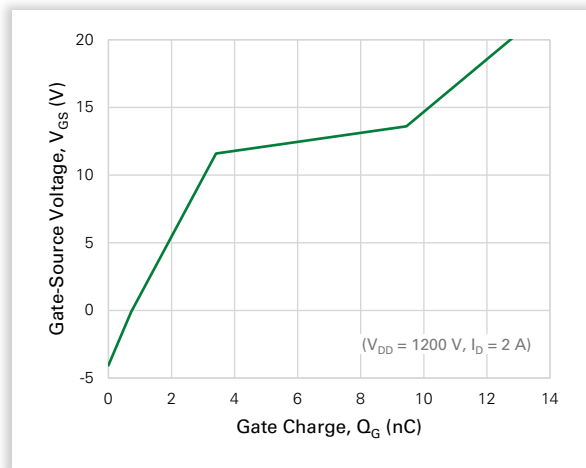


Figure 19. Typical Switching Energy vs. Drain Current

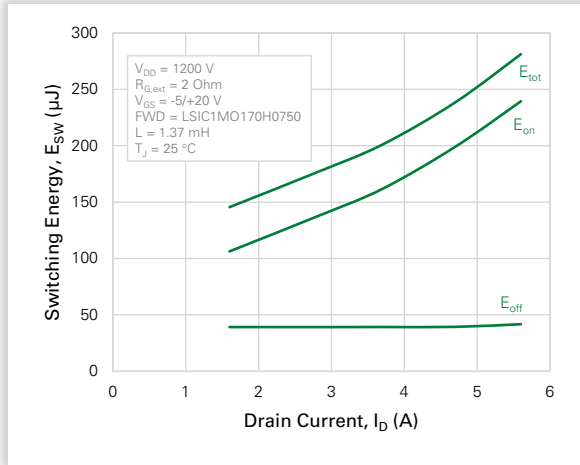


Figure 20. Typical Switching Energy vs. External Gate Resistance

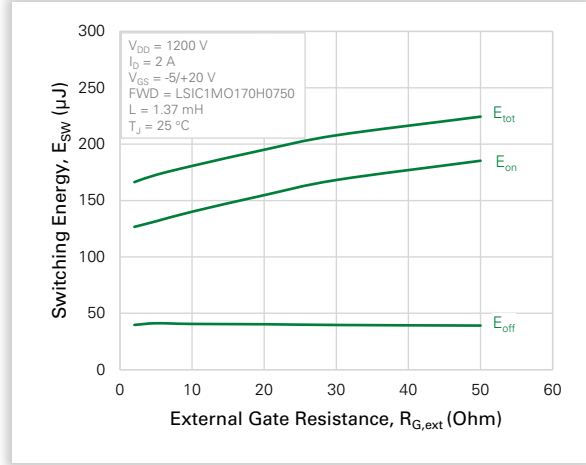
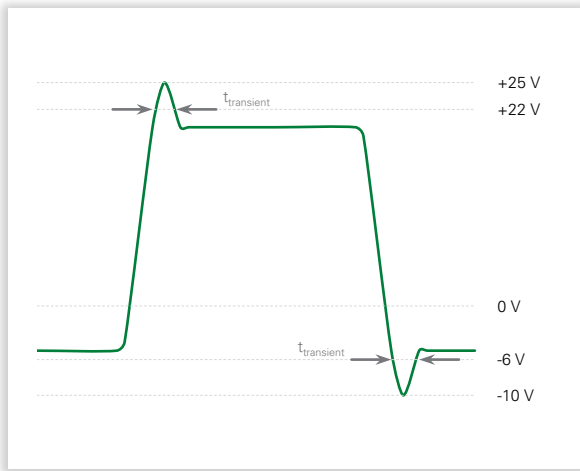
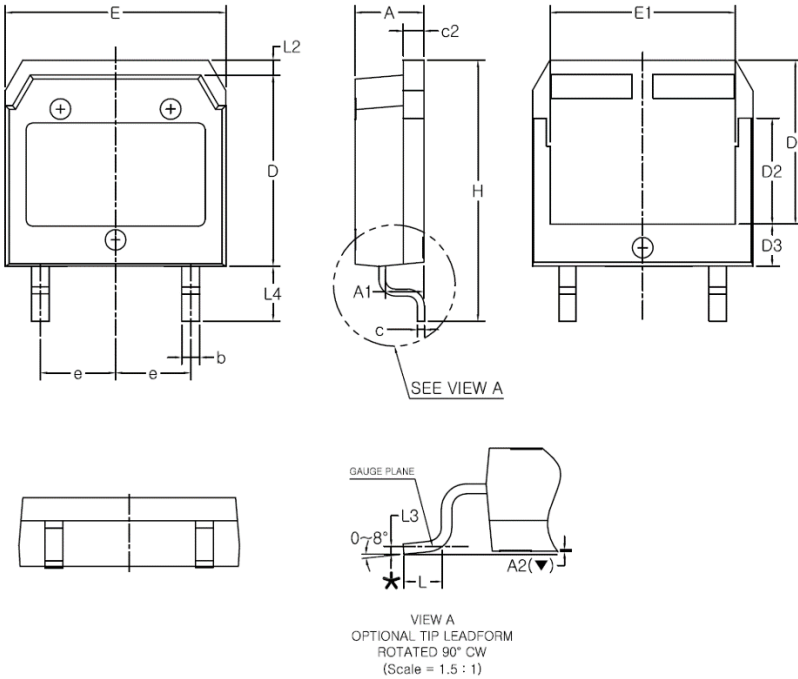


Figure 21. V_GS Waveform Definitions

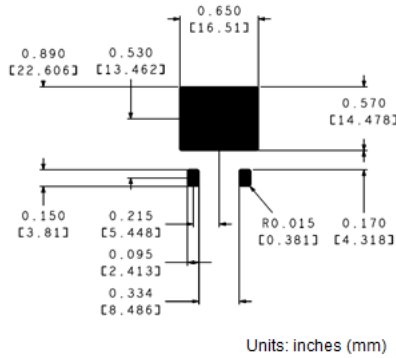


6. Package Dimensions



Symbol	Millimeters		
	Min	Nom	Max
A	4.90	5.00	5.10
A1	2.70	2.80	2.90
A2 (▼)	0.02	-	0.25
b	1.15	1.30	1.45
c	0.40	0.50	0.65
C2	1.46	1.51	1.61
D	13.80	13.90	14.00
D1	11.80	11.95	12.10
D2	7.50	7.65	7.80
D3	2.90	3.05	3.20
E	15.85	15.95	16.05
E1	13.30	13.45	13.60
e	5.45 BSC		
H	18.70	18.90	19.10
★ L	1.70	1.80	2.00
L2	1.00	1.08	1.15
L3	0.25 BSC		
L4	3.80	3.95	4.10

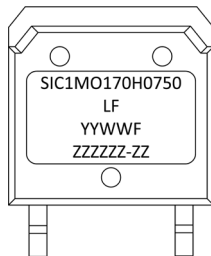
Recommended Solder Pad Layout:



Notes:

1. This drawing meets all dimensions requirements of JEDEC outline TO-268AA except "L" dimension.
2. These dimensions do not include mold flash and they will not exceed 0.13 mm per side.
3. All metal surfaces are matte pure tin except trimmed area.
4. "L3" is gauge plane to measure "L".

7. Part Numbering and Marking

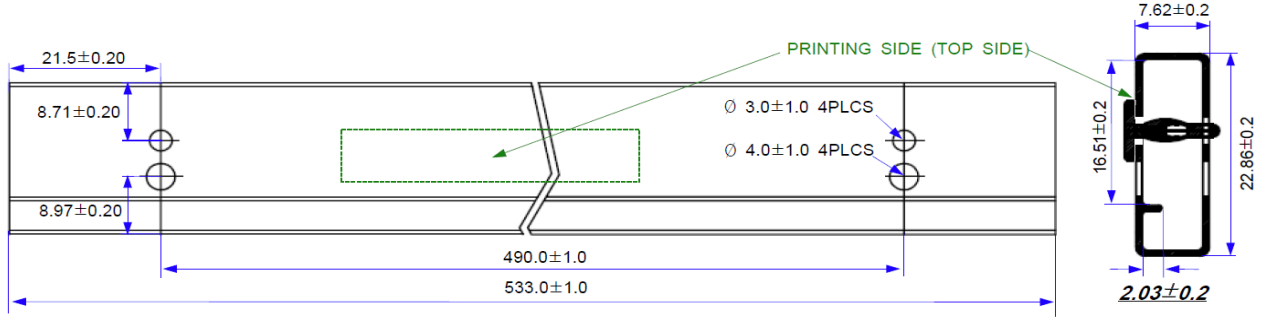


- SIC = SiC
- 1 = Gen 1
- MO = MOSFET
- 170 = Voltage Rating (1700 V)
- H = TO-268-2L
- 0750 = $R_{DS(ON)}$ (750 mOhm)
- YY = Year
- WW = Week
- F = Special Code
- ZZZZZ-ZZ = Lot Number

8. Packing Options

Part Number	Marking	Packing Mode	M.O.Q.
LSIC1MO170H0750-TU	SIC1MO170H0750	Tube (30 pcs)	450
LSIC1MO170H0750-TR	SIC1MO170H0750	Tape and Reel (400 pcs / reel)	400

9. Packing Specifications (Tube Option)



[NOTE 1]

1. TUBE

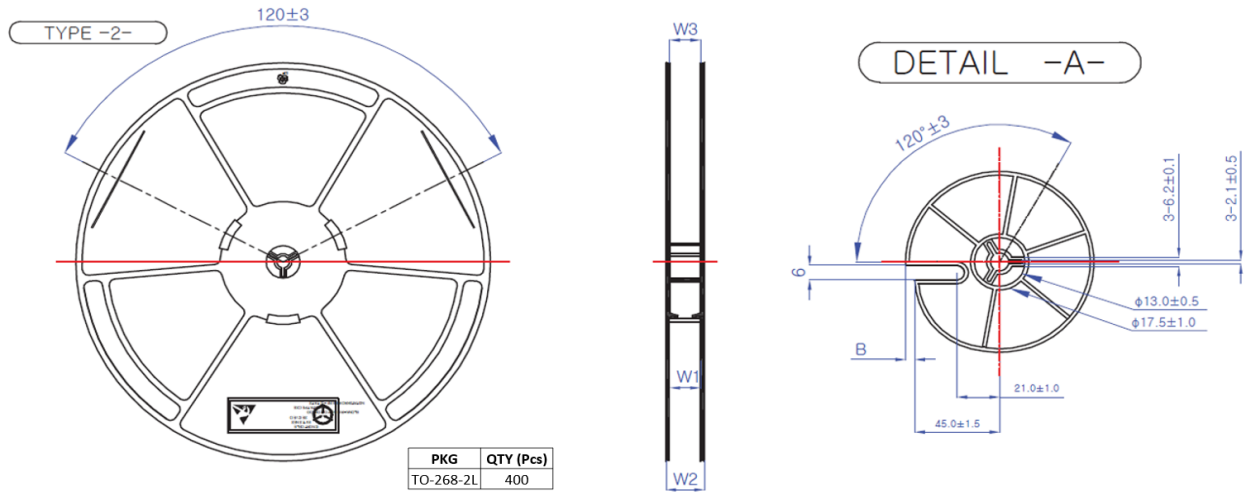
- MATERIAL : PVC / PET (WITH ANTISTATIC COATING)
- COLOR : TRANSPARENCY, RED, YELLOW
- TUBE THICKNESS : 0.64 ± 0.13mm
- TUBE PRINTING COLOR : ALL GREEN COLOR (with each Logo)
- TUBE SURFACE RESISTANCE : 10⁸~10¹¹ Ω/square
- ESD(Electrostatic Discharge) : Less than 100 [volts], 6 Months

3. PACKING QUANTITY

PKG	QTY (PCS)
TO-268-2L	30

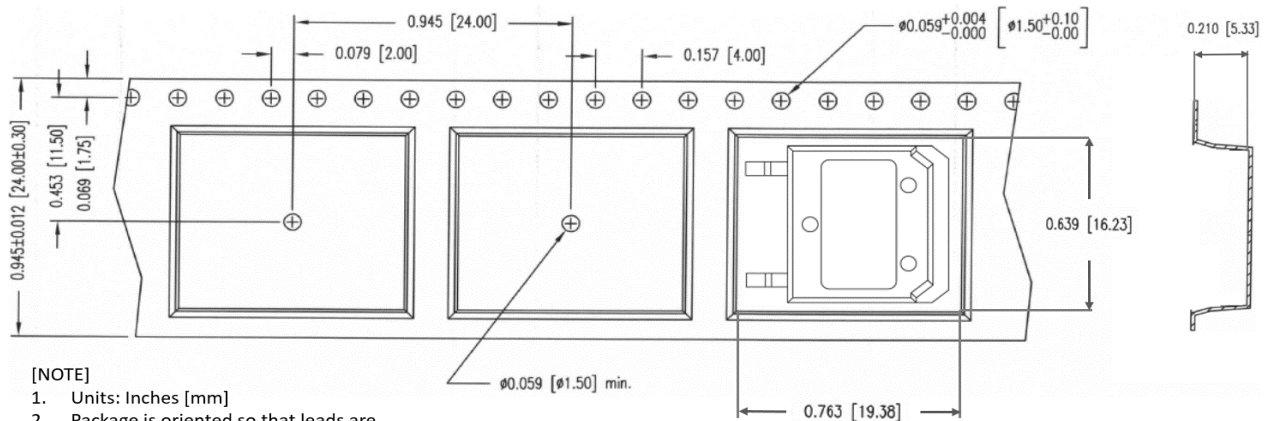


10. Packing Specifications (Tape and Reel Option)



PKG	Normal Width	W1 (+2/-0)	W2 MAX	W3 (+3/-0.5)	B	REEL COLOR
TO-268	24mm	24.4	30.4	24.4	5.5±2	Blue

- [NOTE]
1. MATERIAL : PLASTIC_HIPS (High Impact Polystyrene)
 2. ANTISTATIC : 1 YEAR, MAX ± 100 [Volts]
 3. SURFACE RESISTANCE : Max 10^{-11} [Ω/cm^2]



- [NOTE]
1. Units: Inches [mm]
 2. Package is oriented so that leads are facing trailing end

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