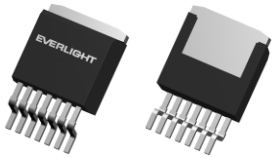
DATASHEET

TO-263-7L 1700V N-Channel Enhancement SiC Power MOSFET
EL-MAH01170XA

Preliminary



V_{DSS}	=	1700	V
I_D	=	5.2	A
$R_{DS(on)}$	=	1	Ω

Features

- Low on-resistance RDS(on)
- Best thermal conductivity and behavior
- High speed switching
- High robustness of dv/dt
- Low capacitances and low gate charge

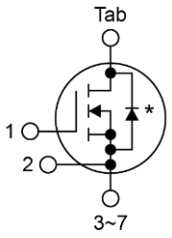
Benefits

- Improve System Efficiency
- Increase Power Density
- Reduce Heat Sink Requirement
- Reduction of System Cost

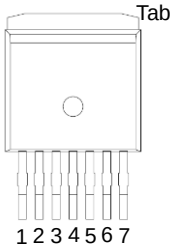
Applications

- Solar Inverters
- EV Battery Chargers
- High Voltage DC/DC Converters
- Switch Mode Power Supply

Schematic



Pin Configuration



1: Gate
2: Driver Source
3~7: Power Source
Tab: Drain
*: Body Diode

Key Performance Parameters

Symbol	V_{DSmin}	V_{GSS}	I_D	I_{DP}	$T_{J,max}$	P_D
Parameter	Drain-Source Voltage	Gate-Source Voltage (DC)	Continuous Drain Current	Pulse Drain Current	Junction temperature	Power Dissipation
Value	1700V	-4~20V	5.2A	-	175 °C	-

Maximum Ratings

Parameter	Symbol	Value	Unit	Test Conditions
Drain - Source Voltage	V_{DSmin}	1700	V	V_{GS}= 0V, I_D= 250μA
Gate - Source Voltage (DC) Max	V_{GS}	-4 / +20V	V	Recommended operating values
Continuous Drain Current	I_D*2	5.2	A	
Pulse Drain Current	I_{DP}	-	A	
Power Dissipation	P_D*3	-	W	
Operating Junction	T_J	175	℃	
Storage Temperature	T_{stg}	-55 to +175	℃	
Solder Temperature	T_L	260	℃	

*1 Please be advised not to use SiC-MOSFETs with V_{GS} below 12V as doing so may cause thermal runaway.
*2 Limited by maximum Ta and for Max. R_{thJC}
*3 P_W ≦ 10μs, Duty cycle ≦ 1%
*4 Tested after applying V_{GS} for 100ms.
*5 Pulsed

Electrical Characteristics

Parameter	Symbol	Value			Unit	Test Conditions
		Min	Typ	Max		
Drain-Source Breakdown Voltage	$V_{(BR)DSS}$	1700	-	-	V	V_{GS}= 0V, I_D= 250μA
Gate Threshold Voltage	$V_{GS(th)}$ *4	2.0	-	4.0	V	V_{DS}= 10V, I_D=1.0mA
Zero Gate Voltage Drain Current	I_{DSS}	-	0.4 12	6 -	μA	V_{DS}= 1700V, V_{GS}= 0V, T_J=25℃ V_{DS}= 1700V, V_{GS}= 0V, T_J=150℃
Gate-Source Leakage Current	I_{GSS+}	-	-	100	nA	V_{GS}= 20V, V_{DS}= 0V
Gate-Source Leakage Current	I_{GSS-}	-	-	-100	nA	V_{GS}= -4V, V_{DS}= 0V
Drain-Source On-State Resistance	$R_{DS(on)}$ *5	-	780	1220	mΩ	V_{GS}= 18V, I_D= 2.6A,T_J= 25℃
		-	1500	-		V_{GS}= 18V, I_D= 2.6A,T_J= 125℃
Input Capacitance	C_{iss}	-	155	-	pF	V_{GS}= 0V V_{DS}= 1000V f= 1MHz
Output Capacitance	C_{oss}	-	14	-		
Reverse Transfer Capacitance	C_{rss}	-	2	-		
Turn-On Switching Loss	E_{on}	-	-	-	μJ	-
Turn-Off Switching Loss	E_{off}	-	-	-	μJ	
Turn-On Delay Time	$t_{d(on)}$	-	-	-	ns	
Rise Time	t_r	-	-	-		
Turn-Off Delay Time	$t_{d(off)}$	-	-	-		
Fall Time	t_f	-	-	-		
Gate to Source Charge	Q_{gs}	-	1.7	-	nC	V_{DD}= 1000V I_{DS}= 1A V_{GS}= 18V
Gate to Drain Charge	Q_{gd}	-	2.5	-		
Total Gate Charge	Q_g	-	8.9	-		

Body Diode Characteristics

Parameter	Symbol	Value		Unit	Test Conditions
		Typ.	Max.		
Diode Forward Voltage	V_{SD}	4.5	-	V	V_{GS}= 0V, I_S= 2.6A
Continuous Diode Forward Current	I_S	-	5.2	A	
Reverse Recover Time	t_{rr}	32	-	ns	I_S= 1.7A V_R= 800V di/dt= 500A/μs
Peak Reverse Recovery Current	I_{rrm}	3.3	-	A	
Reverse recovery charge	Q_{rr}	50	-	nC	

Thermal Characteristics (Measured conformable to JESD51-14.)

Parameter	Symbol	Value		Unit
		Typ	Max	
Thermal Resistance from Junction to Case	$R_{\theta JC}$	-	-	℃/W

Typical Performance

Typical Output Characteristics (I)

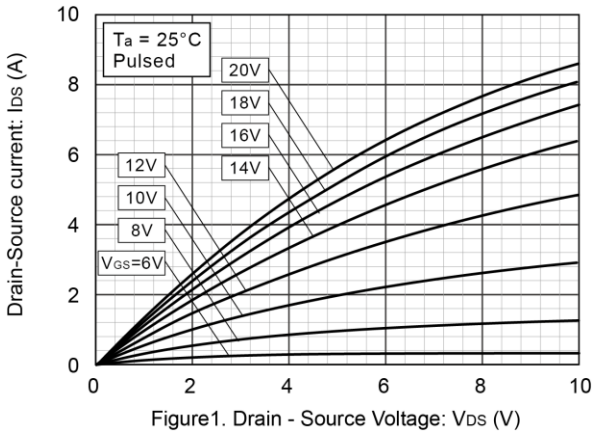


Figure1. Drain - Source Voltage: V_{DS} (V)

Typical Output Characteristics (II)

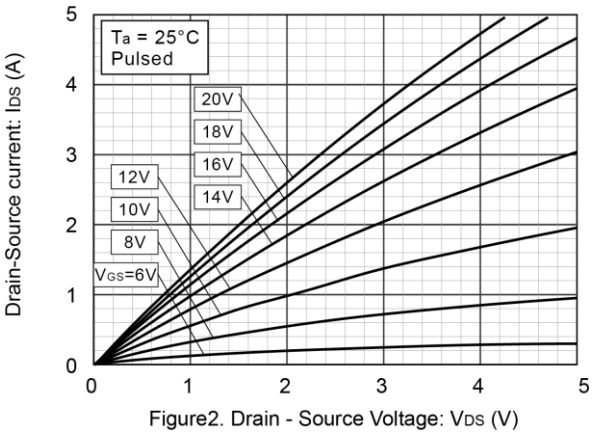


Figure2. Drain - Source Voltage: V_{DS} (V)

Typical Output Characteristics (III) Ta =150ºC

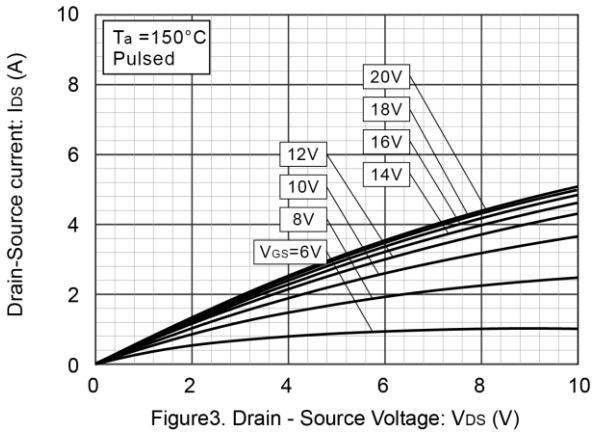


Figure3. Drain - Source Voltage: V_{DS} (V)

Typical Output Characteristics (IV) Ta =150ºC

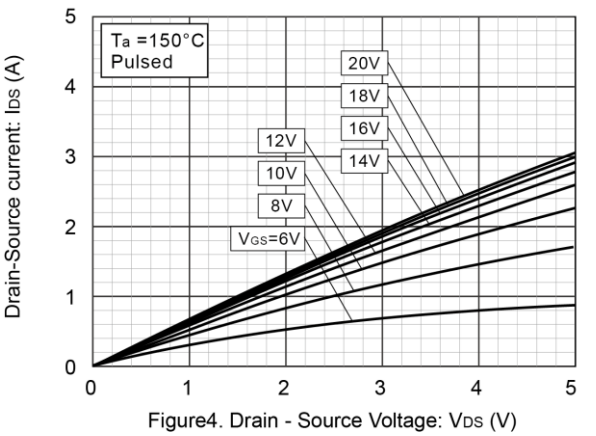


Figure4. Drain - Source Voltage: V_{DS} (V)

Typical Transfer Characteristics (I)

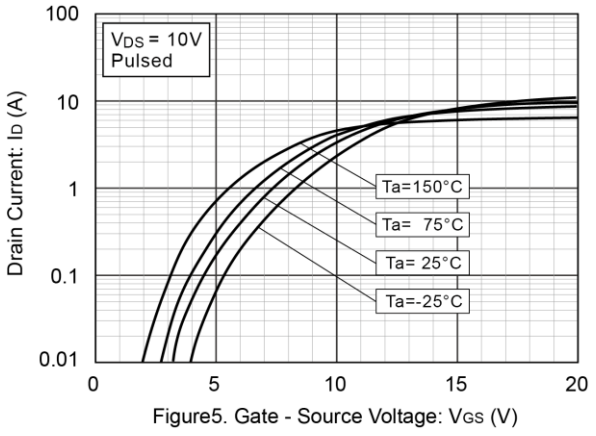


Figure5. Gate - Source Voltage: V_{GS} (V)

Typical Transfer Characteristics (II)

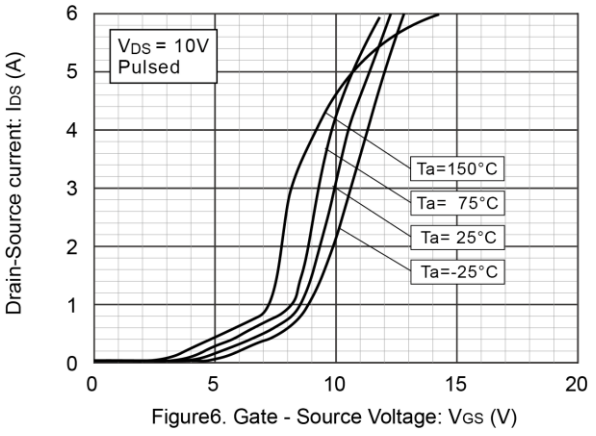
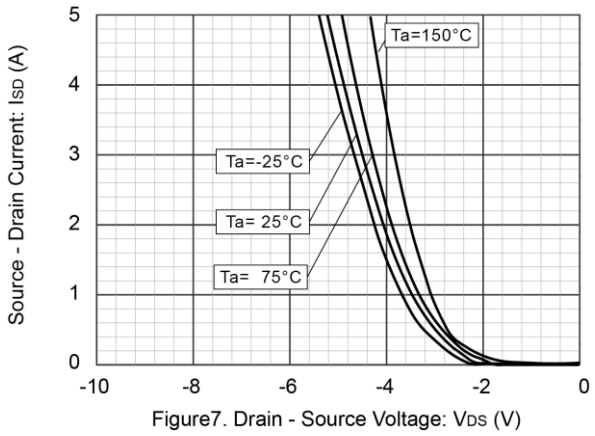
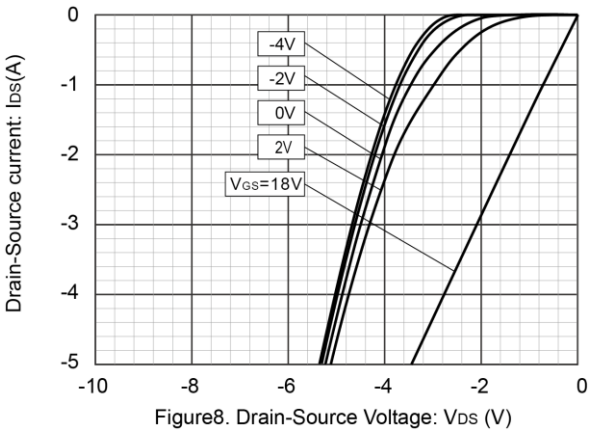


Figure6. Gate - Source Voltage: V_{GS} (V)

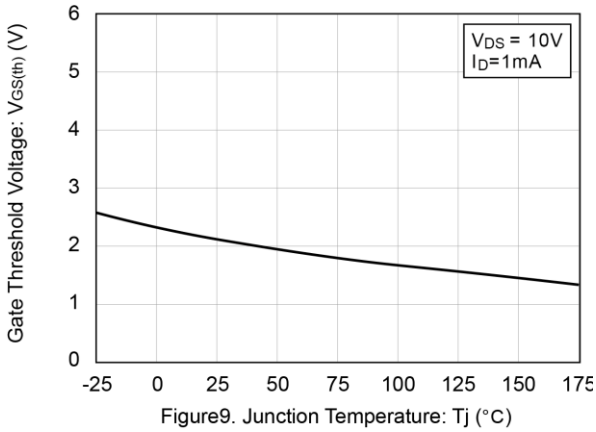
Drain – Source Voltage vs. Source - Drain current



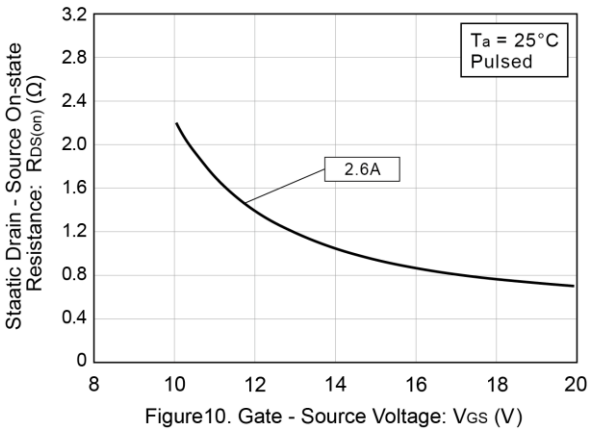
3rd Quadrant Characteristic Ta = 25ºC



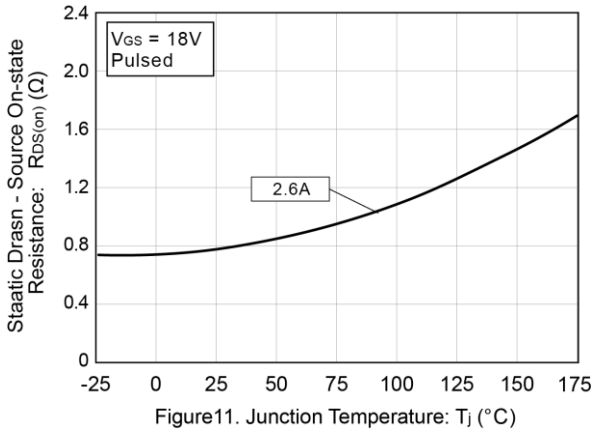
Gate Threshold Voltage vs. Junction Temperature



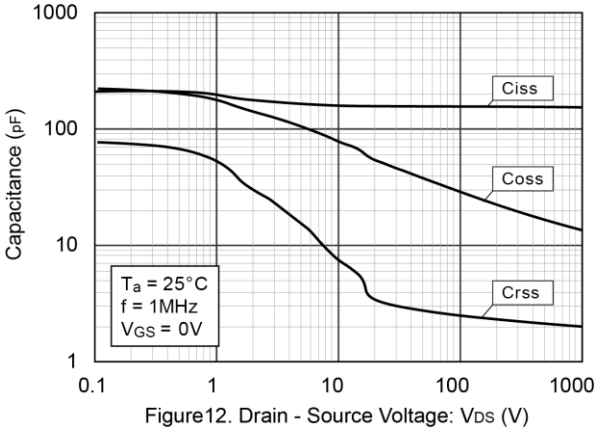
Static Drain - Source On - State Resistance vs. Gate - Source Voltage



Static Drain - Source On - State Resistance vs. Junction Temperature



Typical Capacitance vs. Drain – Source Voltage



Typical Gate Charge

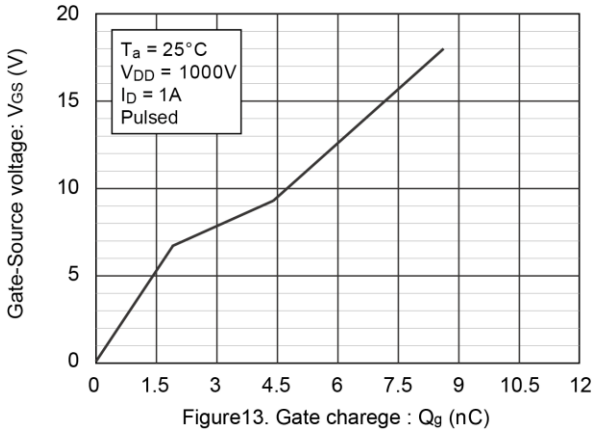
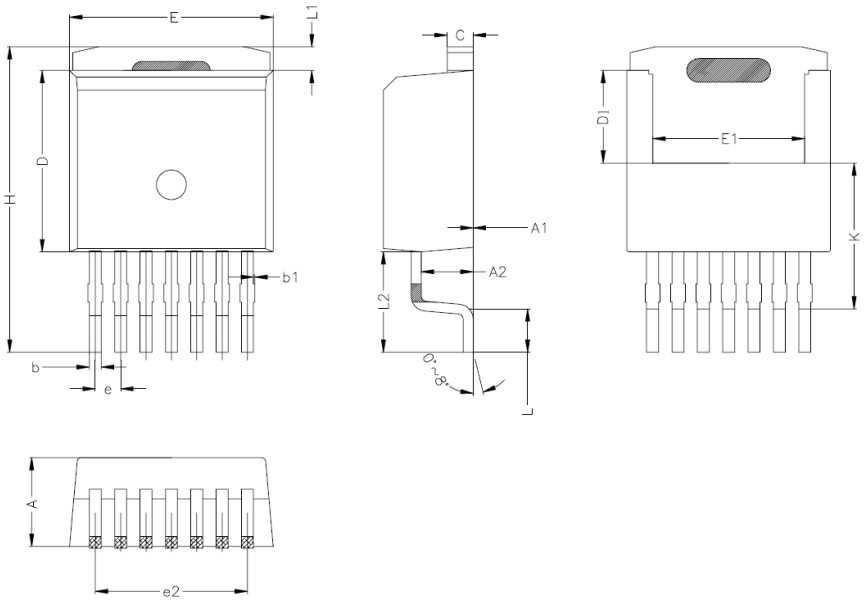


Figure13. Gate charege : Q_g (nC)

Package Outlines

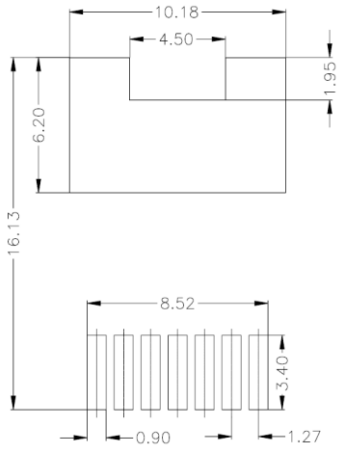


DIM	MILLIMETERS		
	MIN	TYP	MAX
A	4.30	4.50	4.70
A1	0.00	0.15	0.30
A2	2.50	2.60	2.70
b	0.50	0.60	0.70
b1			0.25
C	1.20	1.30	1.40
D	9.00	9.20	9.40
D1	4.45	4.70	4.95
E	10.00	10.20	10.40
E1	7.35	7.60	7.85
e	1.27 BSC		
e2	7.62 BSC		
H	15.25	15.50	15.75
L	1.95	2.20	2.45
L1	0.95	1.20	1.45
L2	4.85	5.10	5.35
K	7.20	7.40	7.60

Unit : mm

Drawing and Dimensions

Recommended pad layout for surface mount leadform



Unit : mm

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