RoHS Compliant
HALOGEN-FREE

Magnachip

MDS9652E

Complementary N-P Channel Trench MOSFET

General Description

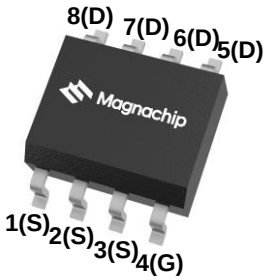
The MDS9652E uses advanced Magnachip's MOSFET Technology to provide low on-state resistance, high switching performance and excellent reliability

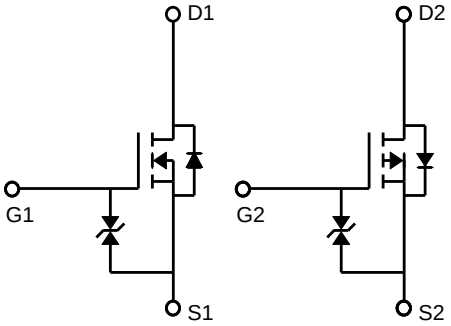
Features

N-Channel	P-Channel
▫ V_{DS} = 30V	V_{DS} = -30V
▫ I_D = 7.2A @ V_{GS} = 10V	I_D = -6.1A @ V_{GS} = -10V
▫ $R_{DS(ON)}$	$R_{DS(ON)}$
<23mΩ @ V_{GS} = 10V	<38mΩ @ V_{GS} = -10V
<30mΩ @ V_{GS} = 4.5V	<52mΩ @ V_{GS} = -4.5V

Applications

- ▫ Inverters
- ▫ General purpose applications





Absolute Maximum Ratings (T_a =25°C unless otherwise noted)

Characteristics		Symbol	Rating		Unit
			N-Ch	P-Ch	
Drain-Source Voltage		V_{DSS}	30	-30	V
Gate-Source Voltage		V_{GSS}	±20	±20	V
Continuous Drain Current	T_a=25°C	I_D	7.2	-6.1	A
	T_a=100°C		4.6	-3.8	A
Pulsed Drain Current		I_{DM}	30	-30	A
Power Dissipation(1)	T_a=25°C	P_D	2	2	W
	T_a=100°C		0.8	0.8	
Single Pulse Avalanche Energy(2)		E_{AS}	32	72	mJ
Junction and Storage Temperature Range		T_J, T_{stg}	-55~150		°C

Thermal Characteristics

Characteristics	Device	Symbol	Rating	Unit
Thermal Resistance, Junction-to-Ambient(Steady-State)(1)	N-Ch	$R_{\theta JA}$	62.5	°C/W
Thermal Resistance, Junction-to-Case	N-Ch	$R_{\theta JC}$	50	
Thermal Resistance, Junction-to-Ambient(Steady-State)(1)	P-Ch	$R_{\theta JA}$	62.5	
Thermal Resistance, Junction-to-Case	P-Ch	$R_{\theta JC}$	50	

Ordering Information

Part Number	Temp. Range	Package	Packing	RoHS Status
MDS9652EURH	-55~150°C	SOIC-8L	Tape & Reel	Halogen Free

N-channel Electrical Characteristics (T_a =25°C unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = 250μA, V_{GS} = 0V	30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = 250μA	1.0	1.9	3.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = 24V, V_{GS} = 0V	-		1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12V, V_{DS} = 0V	-	-	10	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = 10V, I_D = 7.2A	-	15	23	mΩ
		V_{GS} = 4.5V, I_D = 5.0A	-	19	30	
Forward Transconductance	g_{FS}	V_{DS} = 5V, I_D = 7.2A	-	20	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = 15V, I_D = 7.2A, V_{GS} = 10V	-	12.8	-	nC
Gate-Source Charge	Q_{gs}		-	1.9	-	
Gate-Drain Charge	Q_{gd}		-	2.7	-	
Input Capacitance	C_{iss}	V_{DS} = 15V, V_{GS} = 0V, f = 1.0MHz	-	635	-	pF
Reverse Transfer Capacitance	C_{rss}		-	82	-	
Output Capacitance	C_{oss}		-	158	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = 10V ,V_{DS} = 15V, R_L = 2.2Ω, R_{GEN} = 6Ω	-	4.2	-	ns
Turn-On Rise Time	t_r		-	23.0	-	
Turn-Off Delay Time	$t_{d(off)}$		-	37.0	-	
Turn-Off Fall Time	t_f		-	22.0	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = 1A, V_{GS} = 0V	-	0.75	1.0	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = 7.2A, di/dt = 100A/μs	-	17	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	8	-	nC

Note :

1. Surface mounted FR-4 board with 2oz. Copper.
2. Starting TJ = 25°C, L = 1mH, IAS = 8A, VDD = 15V, VGS = 10V

P-channel Electrical Characteristics (T_a =25°C unless otherwise noted)

Characteristics	Symbol	Test Condition	Min	Typ	Max	Unit
Static Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	I_D = -250μA, V_{GS} = 0V	-30	-	-	V
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} = V_{GS}, I_D = -250μA	-1.0	-1.9	-3.0	
Drain Cut-Off Current	I_{DSS}	V_{DS} = -24V, V_{GS} = 0V	-		-1.0	μA
Gate Leakage Current	I_{GSS}	V_{GS} = ±12V, V_{DS} = 0V	-	-	±10	
Drain-Source ON Resistance	$R_{DS(ON)}$	V_{GS} = -10V, I_D = -6.1A	-	23	38	mΩ
		V_{GS} = -4.5V, I_D = -5.0A	-	33	52	
Forward Transconductance	g_{FS}	V_{DS} = -5V, I_D = -6.1A	-	15	-	S
Dynamic Characteristics						
Total Gate Charge	Q_g	V_{DS} = -15V, I_D = -6.1A, V_{GS} = -10V	-	25.1	-	nC
Gate-Source Charge	Q_{gs}		-	4.1	-	
Gate-Drain Charge	Q_{gd}		-	4.9	-	
Input Capacitance	C_{iss}	V_{DS} = -15V, V_{GS} = 0V, f = 1.0MHz	-	1128	-	pF
Reverse Transfer Capacitance	C_{rss}		-	127	-	
Output Capacitance	C_{oss}		-	218	-	
Turn-On Delay Time	$t_{d(on)}$	V_{GS} = -10V ,V_{DS} = -15V, R_L = 15Ω, R_{GEN} = 6Ω	-	11.6	-	ns
Turn-On Rise Time	t_r		-	20.8	-	
Turn-Off Delay Time	$t_{d(off)}$		-	27.6	-	
Turn-Off Fall Time	t_f		-	11.6	-	
Drain-Source Body Diode Characteristics						
Source-Drain Diode Forward Voltage	V_{SD}	I_S = -1A, V_{GS} = 0V	-	-0.75	-1.0	V
Body Diode Reverse Recovery Time	t_{rr}	I_F = -6.1A, di/dt = 100A/μs	-	21.0	-	ns
Body Diode Reverse Recovery Charge	Q_{rr}		-	13.5	-	nC

Note :

1. Surface mounted RF4 board with 2oz. Copper.
2. Starting TJ = 25°C, L = 1mH, IAS = -12A, VDD = -15V, VGS = -10V

N-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

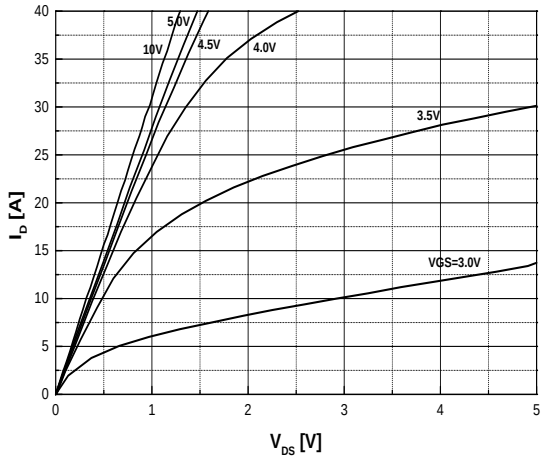


Fig.1 On-Region Characteristics

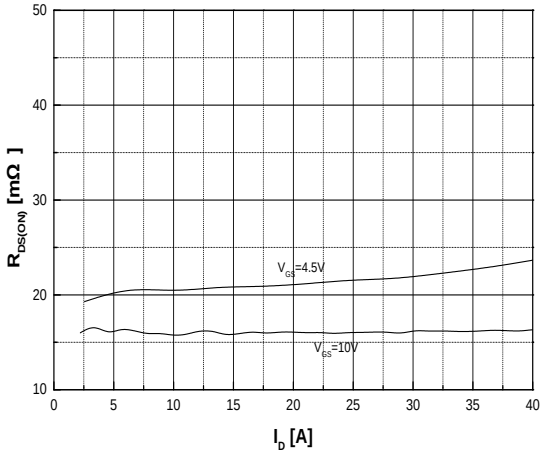


Fig.2 On-Resistance Variation with Drain Current and Gate Voltage

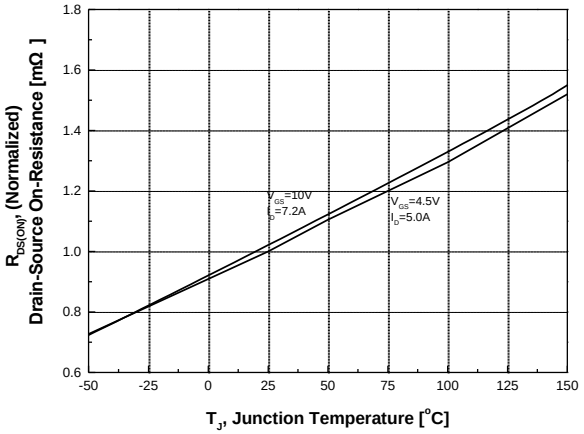


Fig.3 On-Resistance Variation with Temperature

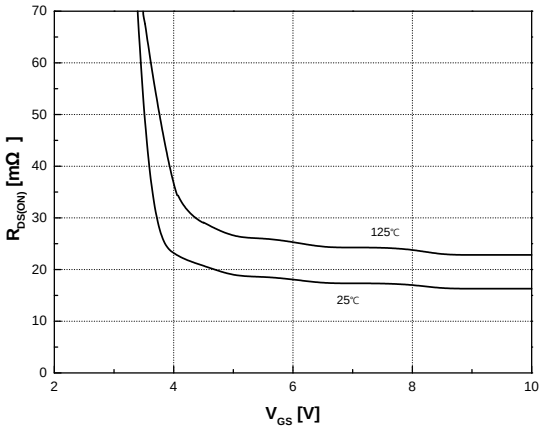


Fig.4 On-Resistance Variation with Gate to Source Voltage

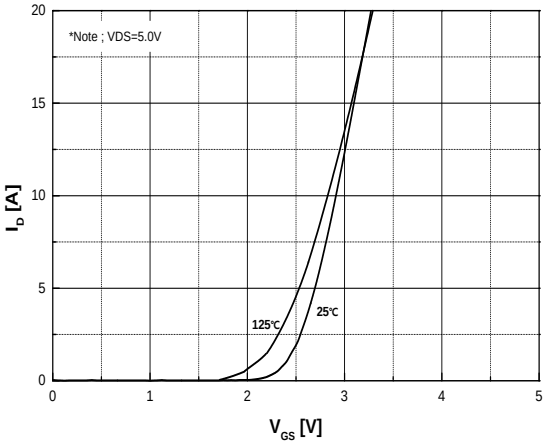


Fig.5 Transfer Characteristics

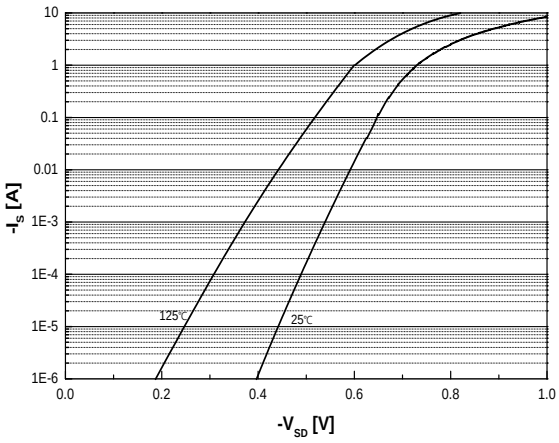


Fig.6 Body Diode Forward Voltage Variation with Source Current and Temperature

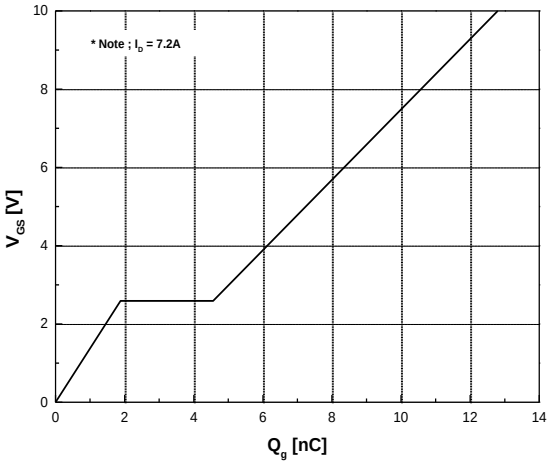


Fig.7 Gate Charge Characteristics

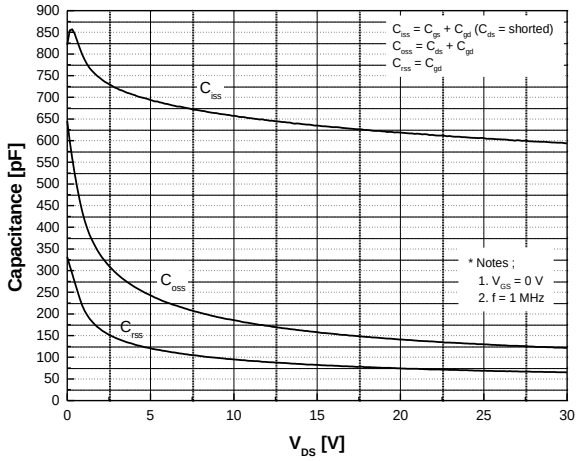


Fig.8 Capacitance Characteristics

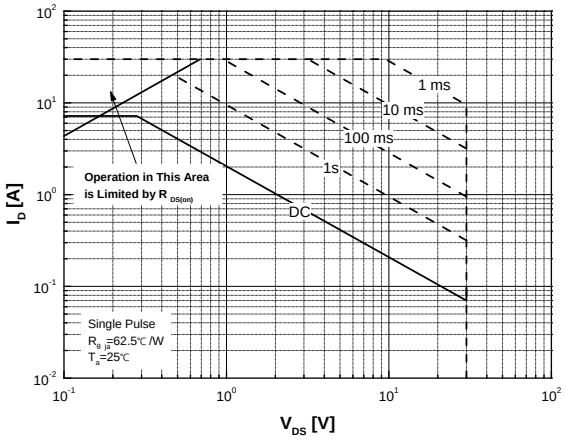


Fig.9 Maximum Safe Operating Area

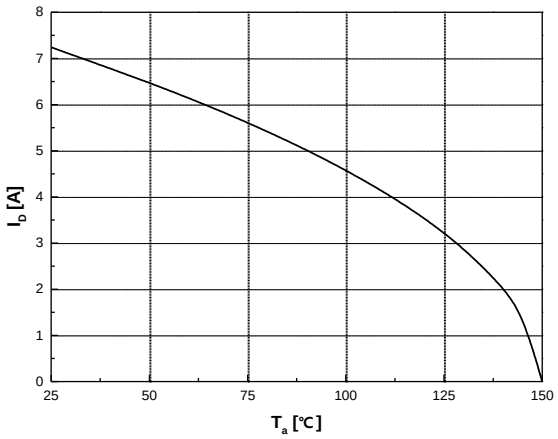


Fig.10 Maximum Drain Current Vs. Ambient Temperature

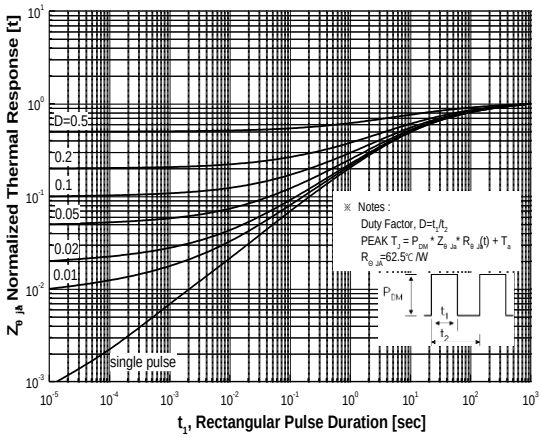


Fig.11 Transient Thermal Response Curve

P-CHANNEL TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

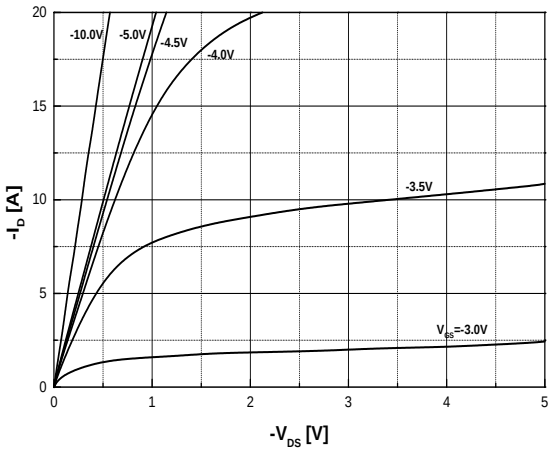


Fig.12 On-Region Characteristics

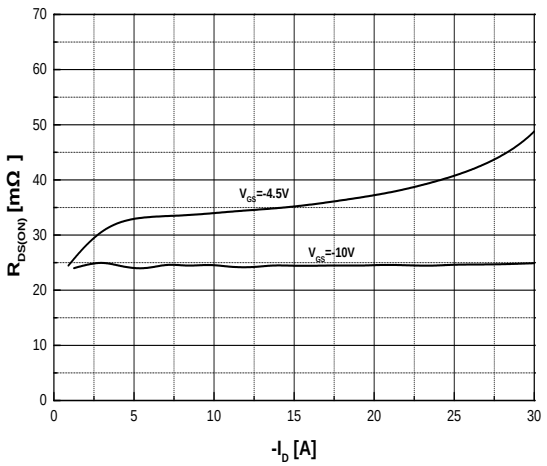


Fig.13 On-Resistance Variation with Drain Current and Gate Voltage

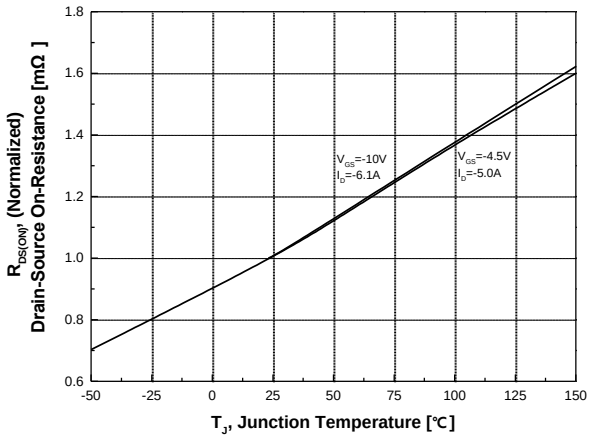


Fig.14 On-Resistance Variation with Temperature

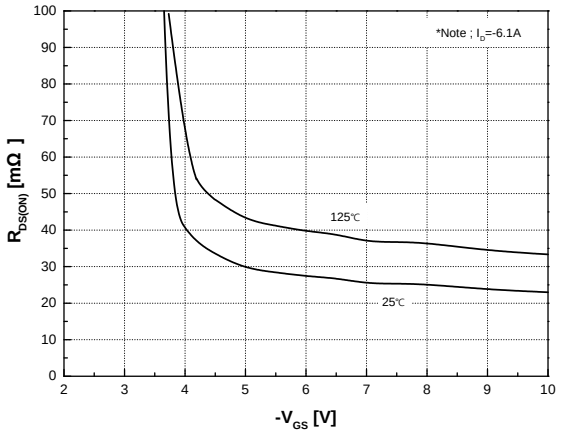


Fig.15 On-Resistance Variation with Gate to Source Voltage

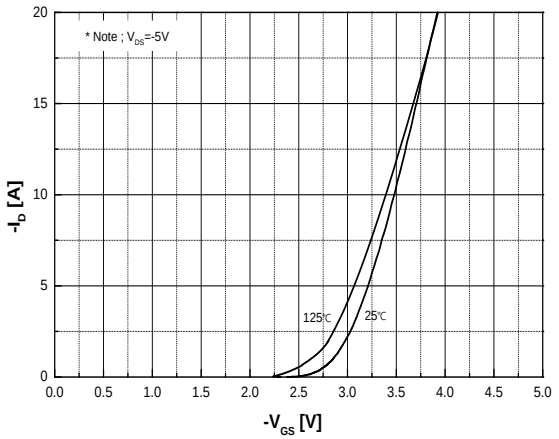


Fig.16 Transfer Characteristics

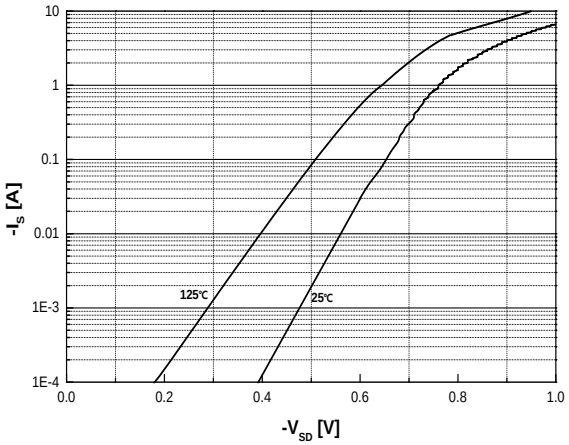


Fig.17 Body Diode Forward Voltage Variation with Source Current and Temperature

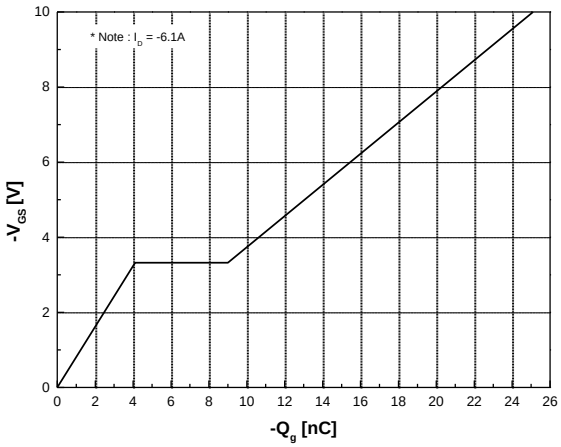


Fig.18 Gate Charge Characteristics

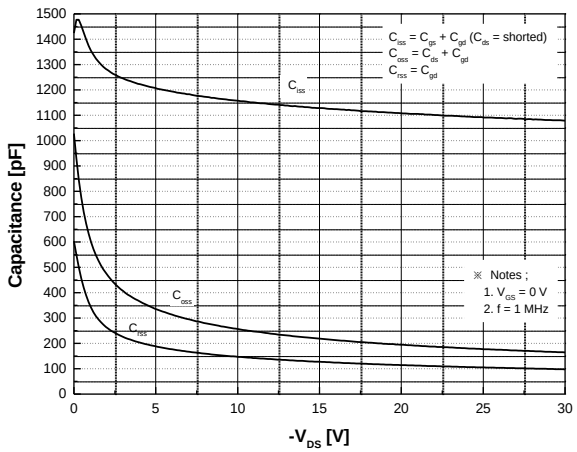


Fig.19 Capacitance Characteristics

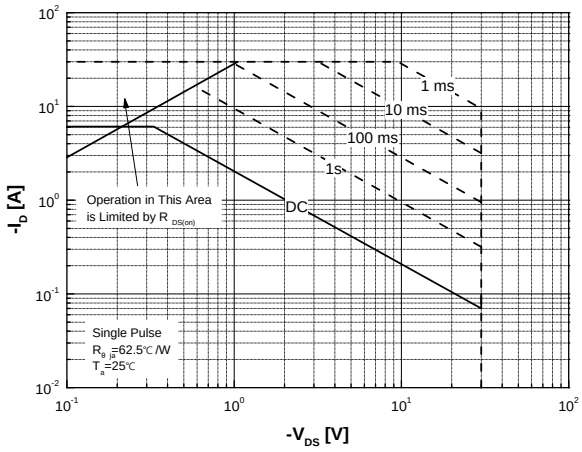


Fig.20 Maximum Safe Operating Area

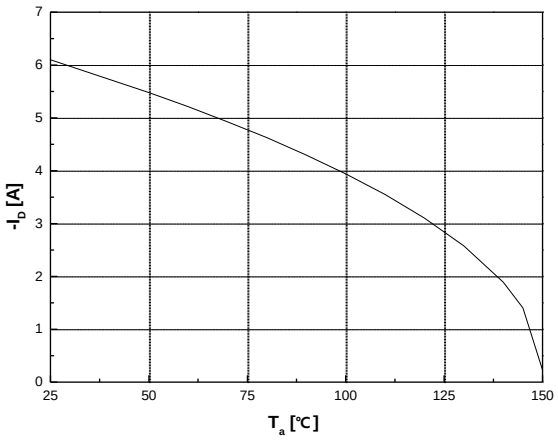


Fig.21 Maximum Drain Current vs. Ambient Temperature

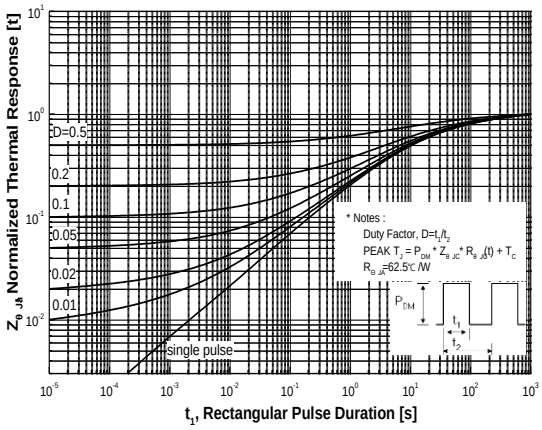
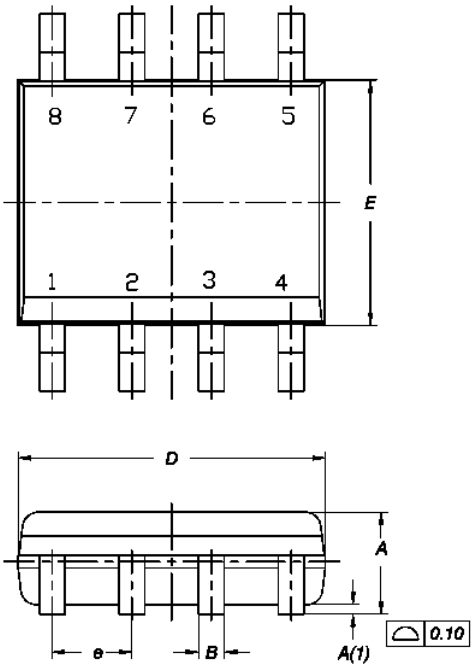


Fig.22 Transient Thermal Response Curve

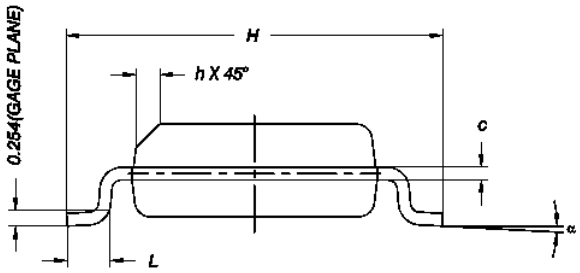
Physical Dimensions

SOIC-8L

Dimensions are in millimeters unless otherwise specified



DIM.	MILLIMETERS		
	MIN.	NOM.	MAX.
A	1.35	1.55	1.75
A(1)	0.10	0.175	0.25
B	0.38	0.445	0.51
C	0.19	0.22	0.25
D	4.80	4.90	5.00
E	3.80	3.90	4.00
e	1.27 BSC		
H	5.80	6.00	6.20
L	0.50	0.715	0.93
α	0°	4°	8°
h	0.25	0.375	0.50



Note : Package body size, length and width do not include mold flash, protrusions and gate burrs.

Worldwide Sales Support Locations

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