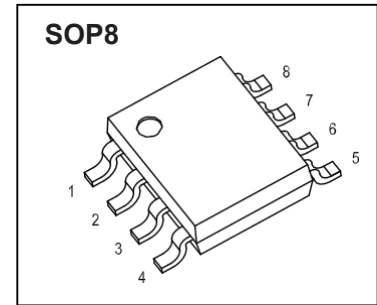




SOP8 Plastic-Encapsulate MOSFETS

CCQ4559 N Channel +P Channel MOSFET

$V_{(BR)DSS}$	$R_{DS(on)TYP}$	I_D
60 V	40mΩ@10V	4.5A
	55mΩ@4.5V	
-60V	60mΩ@-10V	-3.5A
	92mΩ@-4.5V	



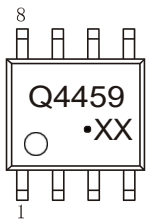
FEATURE

- Surface Mount Package
- Super High Density Cell Design for Extremely Low $R_{DS(ON)}$
- AEC Q101 qualified

APPLICATION

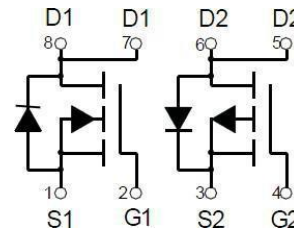
- CCFL Inverter

MARKING



Q4459 = Device code.
 Solid dot = Green molding compound device,
 if none, the normal device.
 XX = Code.

Equivalent Circuit



ABSOLUTE MAXIMUM RATINGS ($T_a=25C$ unless otherwise noted)

Parameter	Symbol	Value	Unit
N-MOSFET			
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (note 1)	I_D	4.5	A
Pulsed Drain Current ($t_p=10\mu s$)	I_{DM}	18	A
Continuous Source-Drain Diode Current	I_S	4.5	A
P-MOSFET			
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (note 1)	I_D	-3.5	A
Pulsed Drain Current ($t_p=10\mu s$)	I_{DM}	-14	A
Continuous Source-Drain Diode Current	I_S	-3.5	A
Temperature and Thermal Resistance			
Power Dissipation	P_D	2.4	W
Thermal Resistance from Junction to Ambient (note 1)	$R_{\theta JA}$	62.5	°C/W
Junction Temperature	T_J	175	°C
Storage Temperature	T_{STG}	-55~+175	°C
Lead Temperature for Soldering Purposes(1/8" from case for 10 s)	T_L	260	°C

MOSFET ELECTRICAL CHARACTERISTICS

N-ch MOSFET ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
STATIC CHARACTERISTICS						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D =250μA	60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} =60V, V _{GS} = 0V			1	μA
Gate-body leakage current	I _{GSS}	V _{GS} =±20V, V _{DS} = 0V			±100	nA
Gate threshold voltage (note 2)	V _{GS(th)}	V _{DS} =V _{GS} , I _D =250μA	1	2.1	3.5	V
Drain-source on-resistance(note 2)	R _{DS(on)}	V _{GS} =10V, I _D =4.3A		40	58	mΩ
		V _{GS} =4.5V, I _D =3.9A		55	72	mΩ
Forward tranconductance(note 2)	g _{FS}	V _{DS} =15V, I _D =4.3A		15		S
Diode forward voltage	V _{SD}	I _S =1.7A, V _{GS} = 0V			1.2	V
DYNAMIC CHARACTERISTICS (note 4)						
Input Capacitance	C _{iss}	V _{DS} =15V, V _{GS} =0V, f =1MHz		665		pF
Output Capacitance	C _{oss}			75		pF
Reverse Transfer Capacitance	C _{rss}			40		pF
Gate Resistance	R _g	f=1MHz			3	Ω
SWITCHING CHARACTERISTICS (note 3,4)						
Turn-on delay time	t _{d(on)}	V _{GEN} =4.5V, V _{DD} =30V, I _D =3.4A, R _G =1mΩ, R _L =8.8mΩ			25	ns
Turn-on rise time	t _r				100	ns
Turn-off delay time	t _{d(off)}				25	ns
Turn-off fall time	t _f				15	ns
Total Gate Charge	Q _g	V _{DS} =30V, I _D =4.3A, V _{GS} =4.5V			9	nC
Gate-Source Charge	Q _{gs}			2.3		nC
Gate-Drain Charge	Q _{gd}			2.6		nC

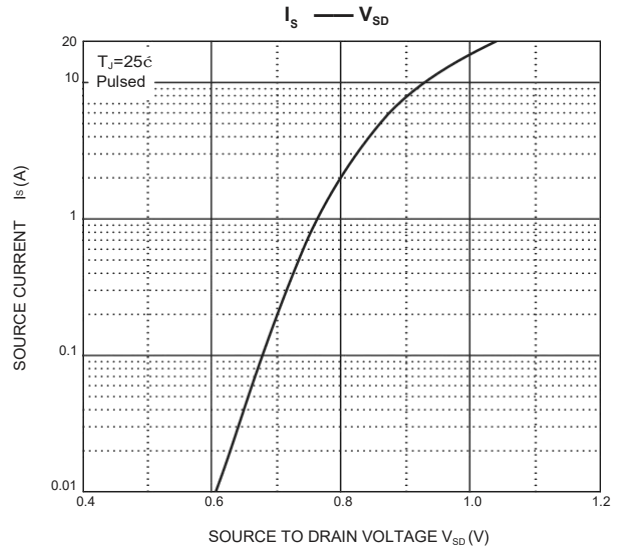
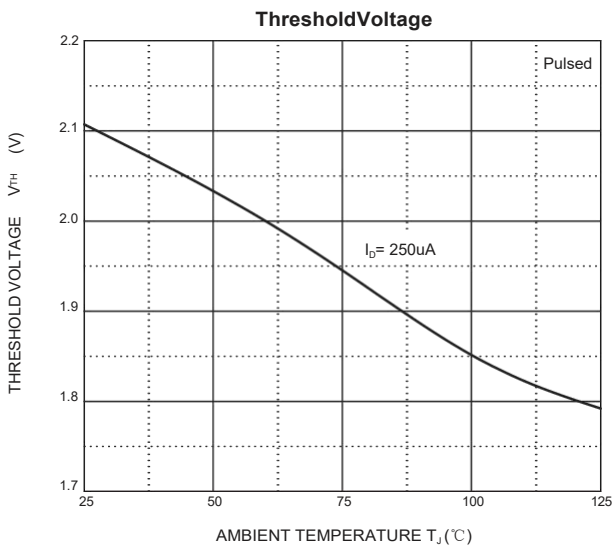
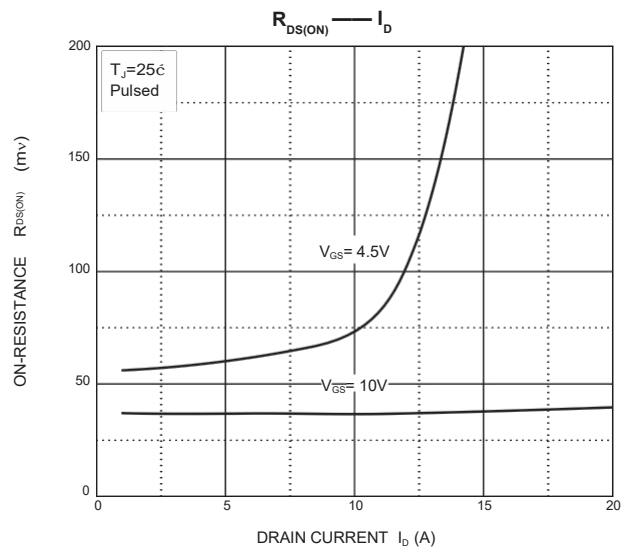
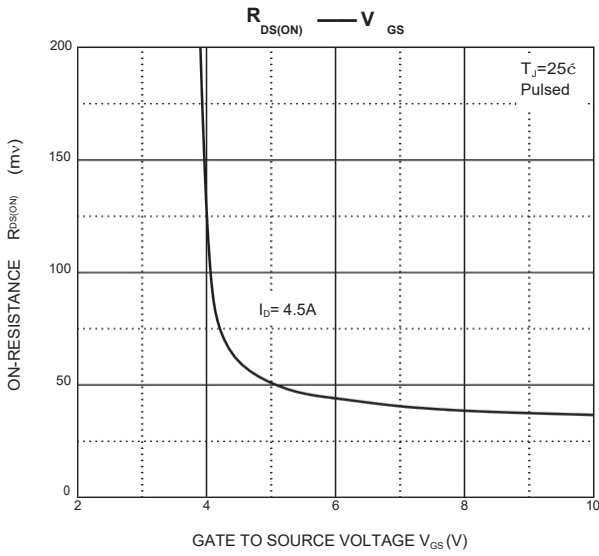
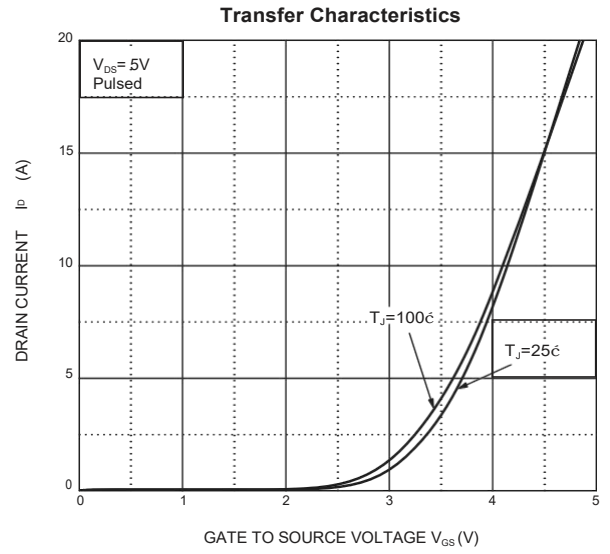
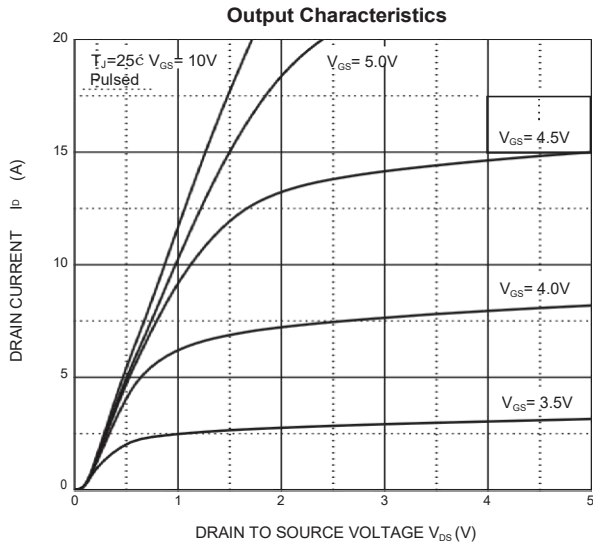
P-ch MOSFET ELECTRICAL CHARACTERISTICS(T_a=25°C unless otherwise noted)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
STATIC CHARACTERISTICS						
Drain-source breakdown voltage	V _{(BR)DSS}	V _{GS} = 0V, I _D = -250μA	-60			V
Zero gate voltage drain current	I _{DSS}	V _{DS} = -60V, V _{GS} = 0V			-1	μA
Gate-body leakage current	I _{GSS}	V _{GS} = ±20V, V _{DS} = 0V			±100	nA
Gate threshold voltage (note 2)	V _{GS(th)}	V _{DS} = V _{GS} , I _D = -250μA	-1	-3.0	-3.5	V
Drain-source on-resistance(note 2)	R _{DS(on)}	V _{GS} = -10V, I _D = -3.1A		60	80	mΩ
		V _{GS} = -4.5V, I _D = -0.2A		92	150	mΩ
Forward transconductance(note 2)	g _{FS}	V _{DS} = -15V, I _D = -3.1A		8.5		S
Diode forward voltage	V _{SD}	I _S = -2A, V _{GS} = 0V			-1.2	V
DYNAMIC CHARACTERISTICS (note 4)						
Input Capacitance	C _{iss}	V _{DS} = -15V, V _{GS} = 0V, f = 1MHz		650		pF
Output Capacitance	C _{oss}			95		pF
Reverse Transfer Capacitance	C _{rss}			60		pF
Gate Resistance	R _g	f = 1MHz			20	Ω
SWITCHING CHARACTERISTICS (note 3,4)						
Turn-on delay time	t _{d(on)}	V _{GEN} = -4.5V, V _{DD} = -30V, I _D = -2.4A, R _G = 1Ω, R _L = 12.5Ω			45	ns
Turn-on rise time	t _r				105	ns
Turn-off delay time	t _{d(off)}				60	ns
Turn-off fall time	t _f				45	ns
Total Gate Charge	Q _g	V _{DS} = -30V, I _D = -3.1A, V _{GS} = -4.5V			12	nC
Gate-Source Charge	Q _{gs}			2.2		nC
Gate-Drain Charge	Q _{gd}			3.7		nC

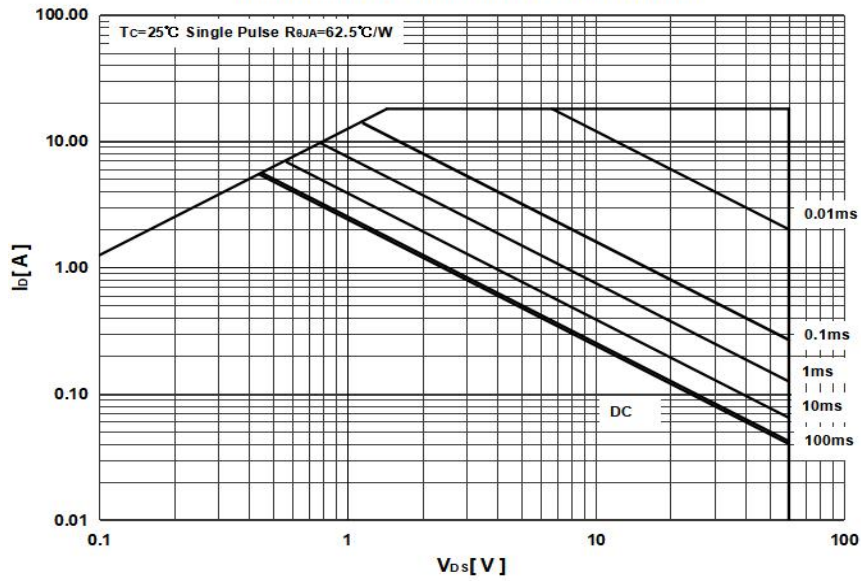
Notes :

1. Surface mounted on FR4 board using the minimum recommended pad size.
2. Pulse Test : Pulse width=300μs, duty cycle:52%.
3. Switching characteristics are independent of operating junction temperature.
4. Guaranteed by design, not subject to production.

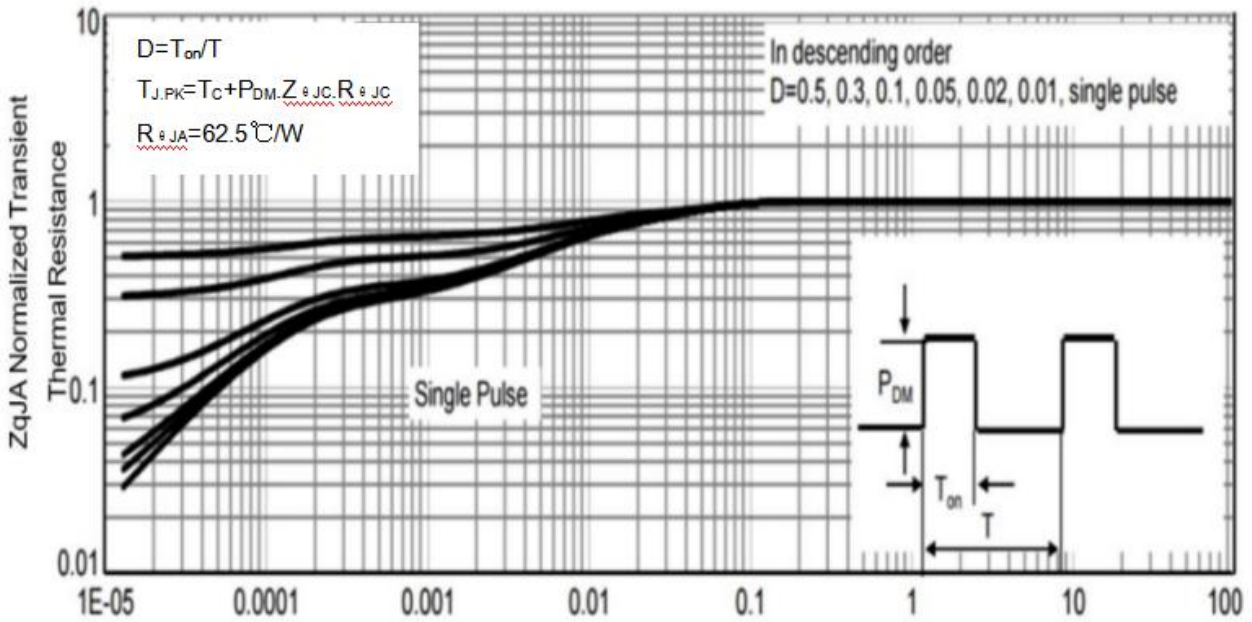
N MOS Typical Characteristics



Maximum Forward Biased Safe Operating Area

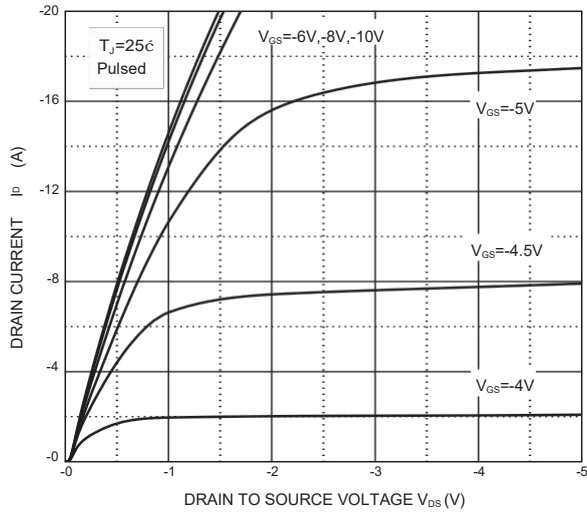


Normalized Thermal Transient Impedance

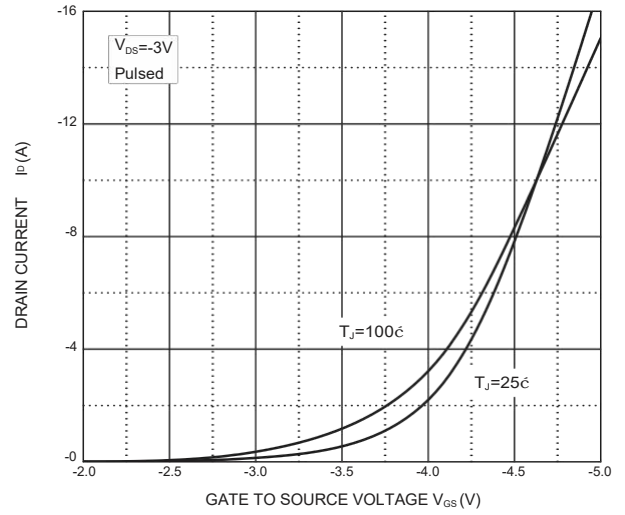


P MOS Typical Characteristics

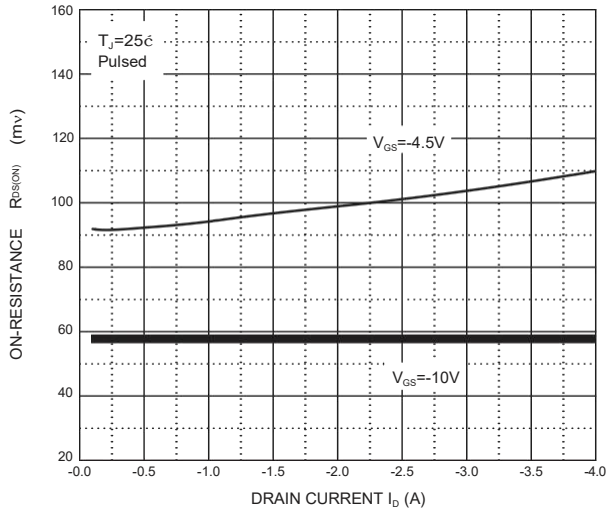
Output Characteristics



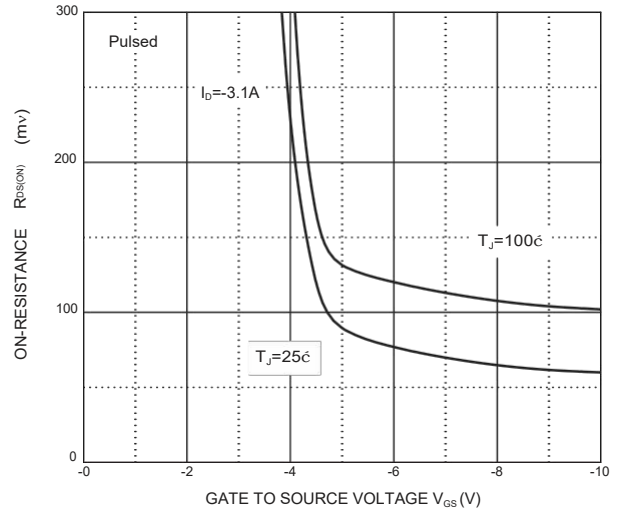
Transfer Characteristics



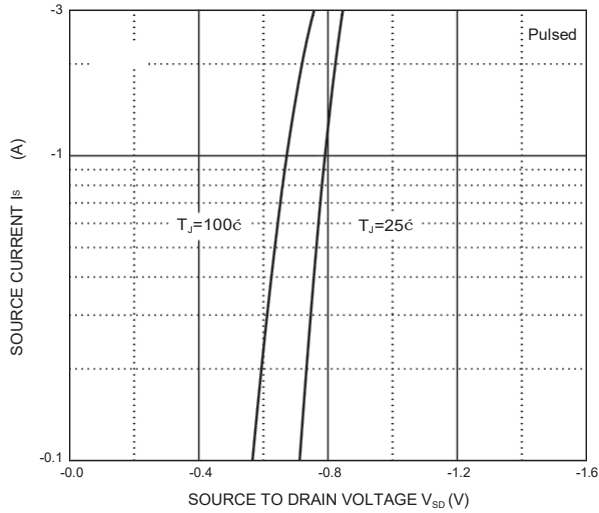
$R_{DS(ON)}$ — I_D



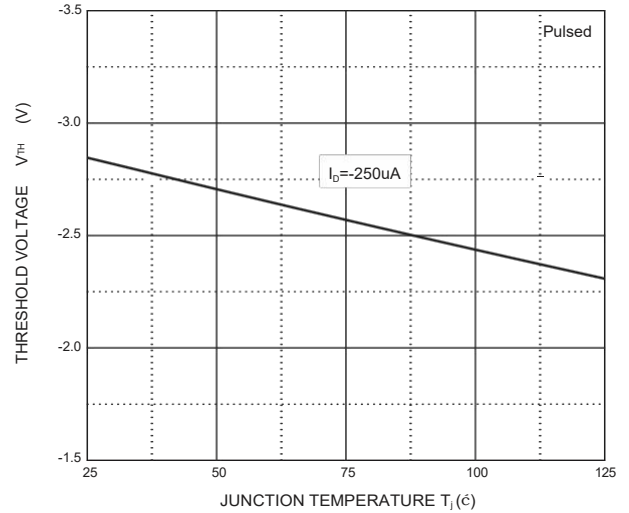
$R_{DS(ON)}$ — V_{GS}



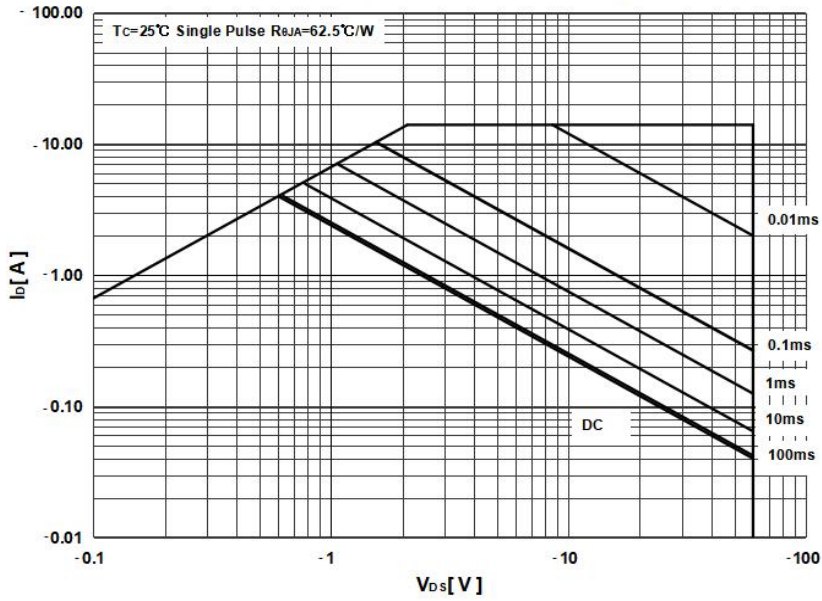
I_S — V_{SD}



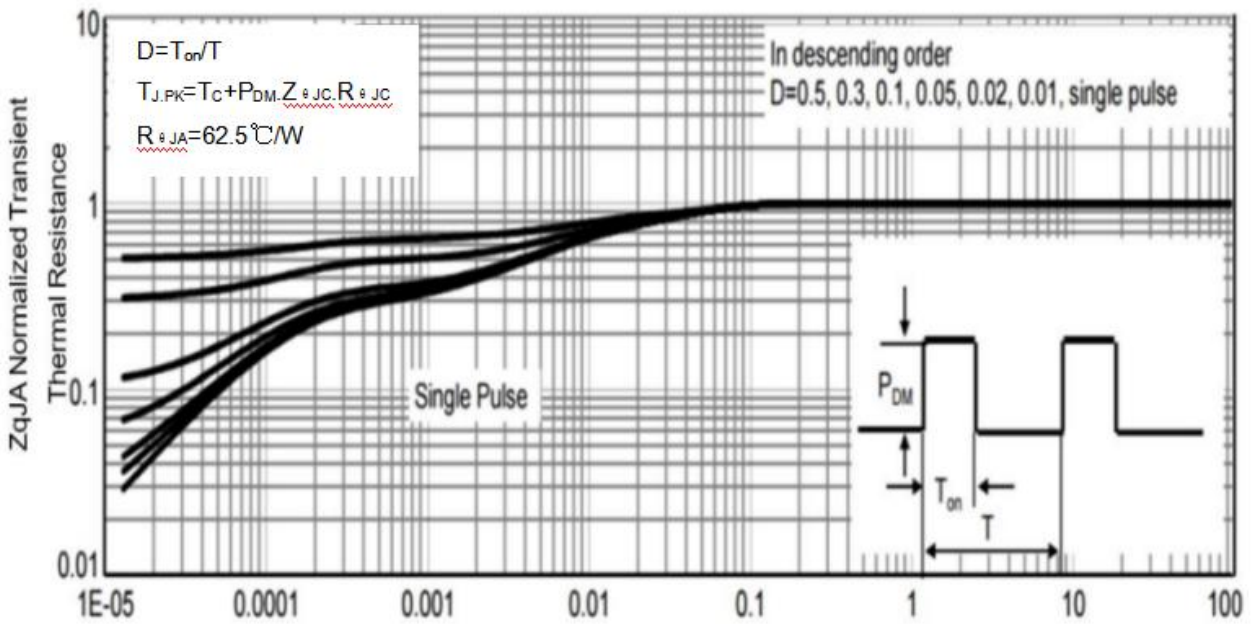
Threshold Voltage



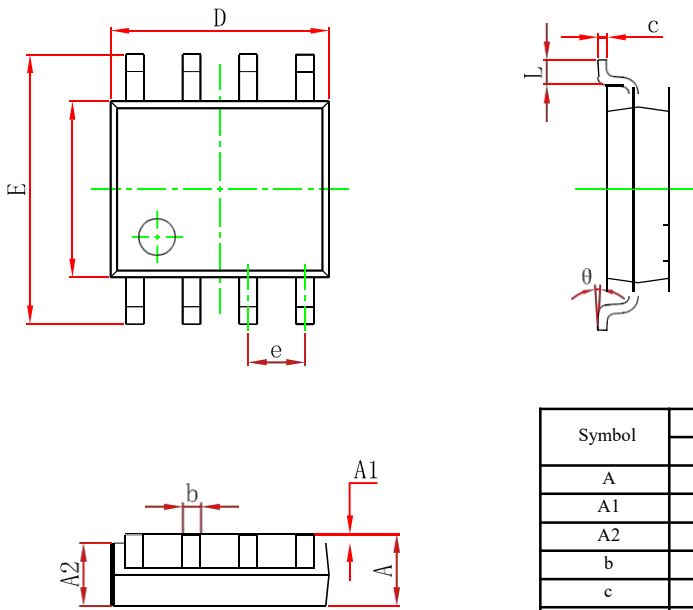
Maximum Forward Biased Safe Operating Area



Normalized Thermal Transient Impedance

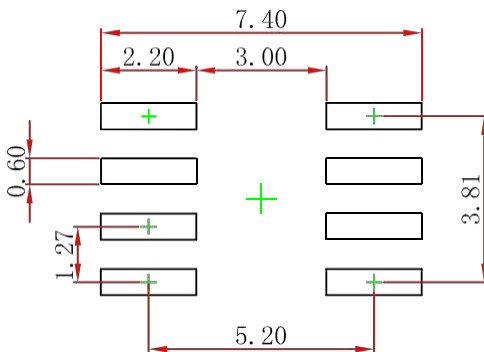


SOP8 Package Outline Dimensions



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.007	0.010
D	4.800	5.000	0.189	0.197
e	1.270 (BSC)		0.050 (BSC)	
E	5.800	6.200	0.228	0.244
E1	3.800	4.000	0.150	0.157
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°

SOP8 Suggested Pad Layout



Note:

1. Controlling dimension: in millimeters.
2. General tolerance: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

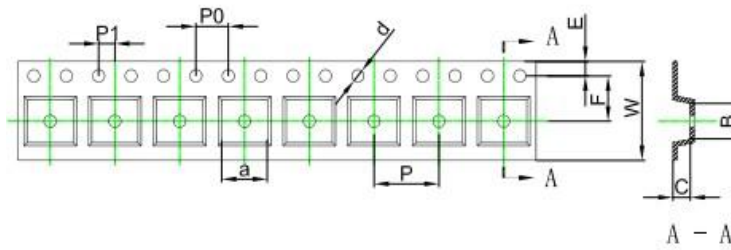
NOTICE

Cloudchild reserve the right to make modifications, enhancements, improvements, corrections or other changes without further notice to any product herein. Cloudchild does not assume any liability arising out of the application or use of any product described herein.

ChongQing Cloudchild Technology Co., Ltd. (short for Cloudchild) exerts the greatest possible effort to ensure high quality and reliability. Nevertheless, semiconductor devices in general can malfunction or fail due to their inherent electrical sensitivity and vulnerability to physical stress. It is the responsibility of the buyer, when utilizing Cloudchild products, to comply with the standards of safety in making a safe design for the entire system, including redundancy, fire-prevention measures, and malfunction prevention, to prevent any accidents, fires, or community damage that may ensue. In developing your designs, please ensure that Cloudchild products are

SOP8 Tape and Reel

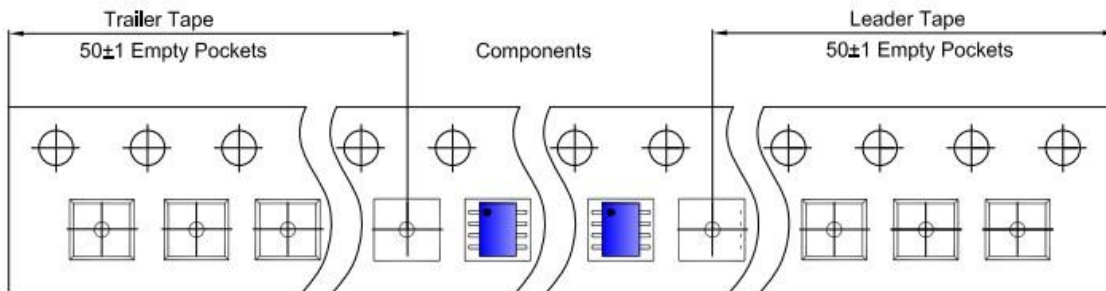
SOP8 Embossed Carrier Tape



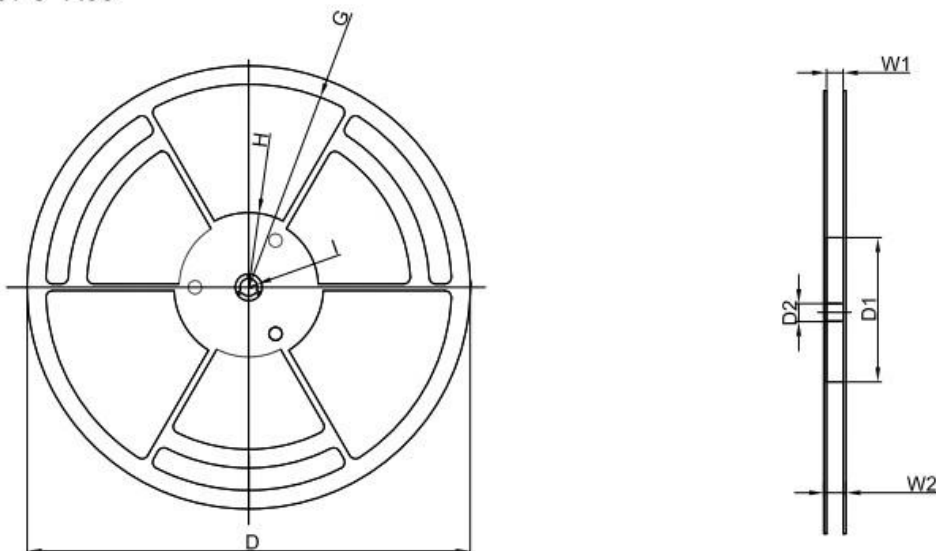
Packaging Description:
 SOP8 parts are shipped in tape. The carrier tape is made from a dissipative (carbon filled) polycarbonate resin. The cover tape is a multilayer film (Heat Activated Adhesive in nature) primarily composed of polyester film, adhesive layer, sealant, and anti-static sprayed agent. These reeled parts in standard option are shipped with 2,500 units per 13" or 33cm diameter reel. The reels are clear in color and is made of polystyrene plastic (anti-static coated).
ALL DIM IN mm

Dimensions are in millimeter										
Pkg type	a	B	C	d	E	F	P0	P	P1	W
SOP8	6.40	5.40	2.10	Ø1.50	1.75	5.50	4.00	8.00	2.00	12.00

SOP8 Tape Leader and Trailer



SOP8 Reel



Dimensions are in millimeter								
Reel Option	D	D1	D2	G	H	I	W1	W2
13" Dia	Ø330.00	100.00	13.00	R151.00	R56.00	R6.50	12.40	17.60

REEL	Reel Size	Box	Box Size(mm)	Carton	Carton Size(mm)	G.W.(kg)
4,000 pcs	13 inch	8,000 pcs	360×360×65	64,000 pcs	565×380×390	

Date of change	Rev #	revise content
2023/02/20	A/0	/