N and P-Channel Enhancement Mode Power MOSFET

Description

The NCE4614B uses advanced trench technology to provide excellent $R_{DS(ON)}$ and low gate charge . The complementary MOSFETs may be used to form a level shifted high side switch, and for a host of other applications.

General Features

- **N-Channel**

  V_{DS} =40V,I_D =8A

  $R_{DS(ON)}$ < 22mΩ @ V_{GS}=10V

  $R_{DS(ON)}$ < 45.5mΩ @ V_{GS}=4.5V

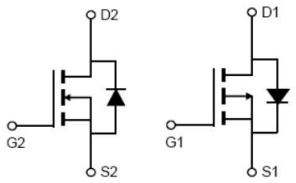
- **P-Channel**

  V_{DS} =-40V,I_D = -7A

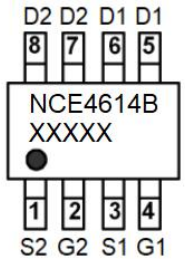
  $R_{DS(ON)}$ <32mΩ @ V_{GS}=-10V

  $R_{DS(ON)}$ < 51mΩ @ V_{GS}=-4.5V

- High power and current handing capability
- Lead free product is acquired
- Surface mount package



N-channel P-channel
Schematic diagram



Marking and pin assignment

SOP-8 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE4614B	NCE4614B	SOP-8	Ø330mm	12mm	4000 units

Absolute Maximum Ratings (T_A=25℃unless otherwise noted)

Parameter		Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage		V_{DS}	40	-40	V
Gate-Source Voltage		V_{GS}	±20	±20	V
Continuous Drain Current	T_A=25℃	I_D	8	-7	A
	T_A=70℃		6	-5.5	
Pulsed Drain Current (Note 1)		I_{DM}	32	-28	A
Maximum Power Dissipation	T_A=25℃	P_D	2.0	2.0	W
Single pulse avalanche energy (Note 5)		E_{AS}	46	40	mJ
Operating Junction and Storage Temperature Range		T_J,T_{STG}	-55 To 150	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note2)	$R_{\theta JA}$	N-Ch	62.5	℃/W
Thermal Resistance,Junction-to-Ambient (Note2)	$R_{\theta JA}$	P-Ch	62.5	℃/W

N-CH Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=250μA	40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=40V,V_{GS}=0V	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	1	1.6	2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=10V, I_D=8A	-	19	22	mΩ
		V_{GS}=4.5V, I_D=4A	-	35	45.5	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V,I_D=8A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=20V,V_{GS}=0V, F=1.0MHz	-	542	-	pF
Output Capacitance	C_{oss}		-	67.5	-	pF
Reverse Transfer Capacitance	C_{rss}		-	57.5	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=20V, R_L=2.5Ω V_{GS}=10V,R_{GEN}=3Ω	-	7	-	nS
Turn-on Rise Time	t_r		-	4	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	17	-	nS
Turn-Off Fall Time	t_f		-	7	-	nS
Total Gate Charge	Q_g	V_{DS}=20V,I_D=8A, V_{GS}=10V	-	15.7	-	nC
Gate-Source Charge	Q_{gs}		-	3.3	-	nC
Gate-Drain Charge	Q_{gd}		-	3.9	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=8A	-	0.8	1.2	V

P-CH Electrical Characteristics (T_A=25℃unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V I_D=-250μA	-40	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-40V,V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V,V_{DS}=0V	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=-250μA	-1.0	-1.6	-2.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-10V, I_D=-7A	-	28	32	mΩ
		V_{GS}=-4.5V, I_D=-4A	-	39	51	mΩ
Forward Transconductance	g_{FS}	V_{DS}=-5V,I_D=-7A	-	10	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS}=-20V,V_{GS}=0V, F=1.0MHz	-	616	-	pF
Output Capacitance	C_{oss}		-	79	-	pF
Reverse Transfer Capacitance	C_{rss}		-	68	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=-20V, R_L=2.9Ω V_{GS}=-10V,R_{GEN}=6Ω	-	7	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	19	-	nS
Turn-Off Fall Time	t_f		-	6	-	nS
Total Gate Charge	Q_g	V_{DS}=-20V,I_D=-7A V_{GS}=-10V	-	17.2	-	nC
Gate-Source Charge	Q_{gs}		-	2.3	-	nC
Gate-Drain Charge	Q_{gd}		-	4.7	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=-7A	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, t ≤ 10 sec.
3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
4. Guaranteed by design, not subject to production
5. EAS condition : Tj=25℃,N: V_{DD}=20V,V_G=10V,L=0.5mH,Rg=25Ω. P: V_{DD}=-20V,V_G=-10V,L=0.5mH,Rg=25Ω.

N- Channel Typical Electrical and Thermal Characteristics (Curves)

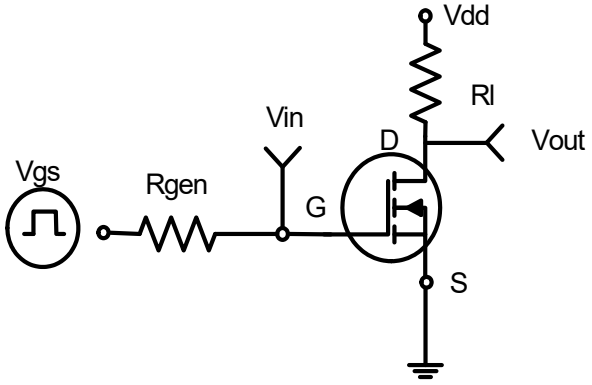


Figure 1:Switching Test Circuit

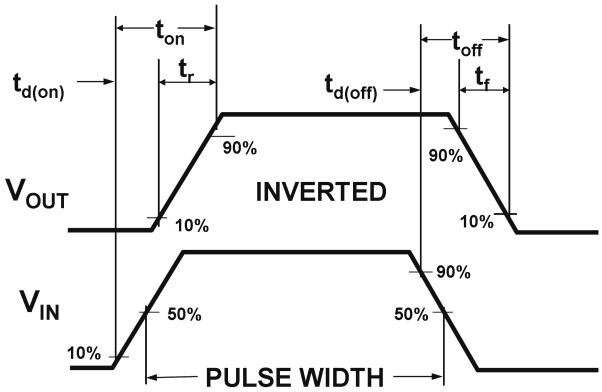


Figure 2:Switching Waveforms

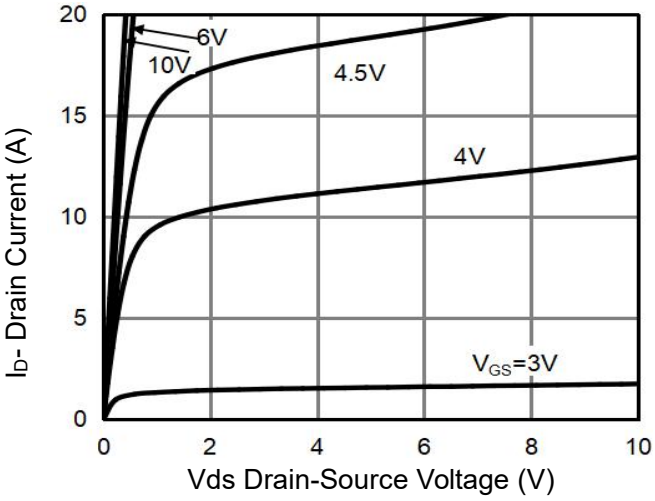


Figure 3 Output Characteristics

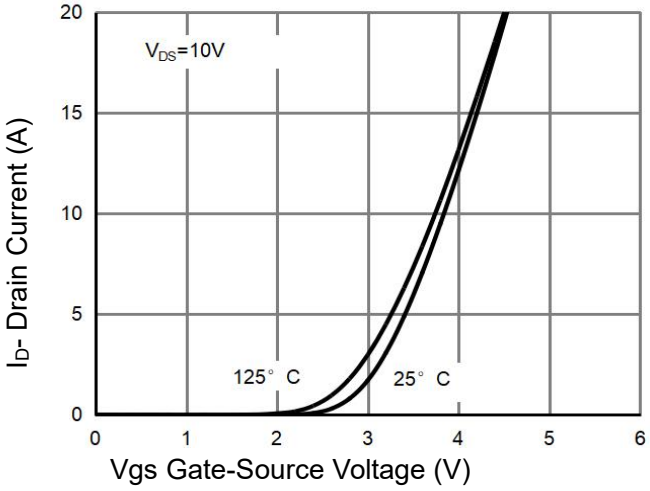


Figure 4 Transfer Characteristics

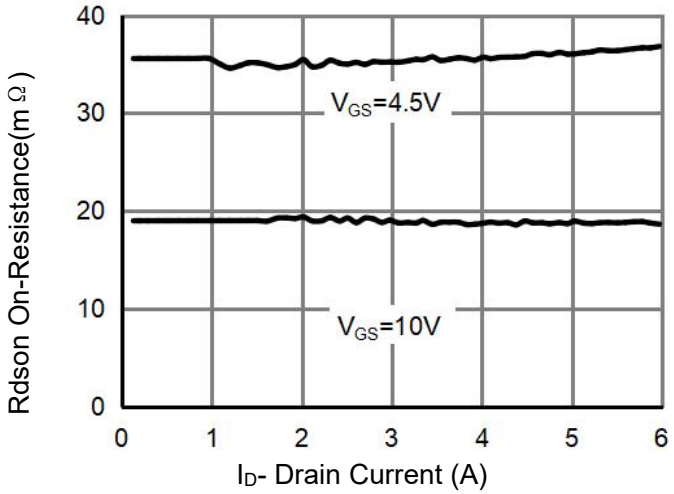


Figure 5 Drain-Source On-Resistance

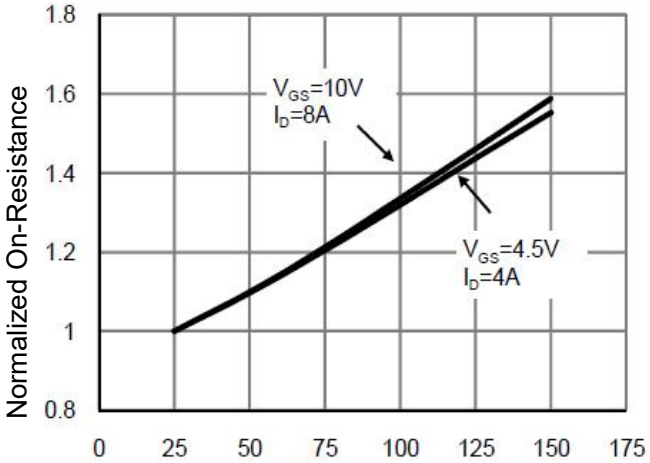


Figure 6 Drain-Source On-Resistance

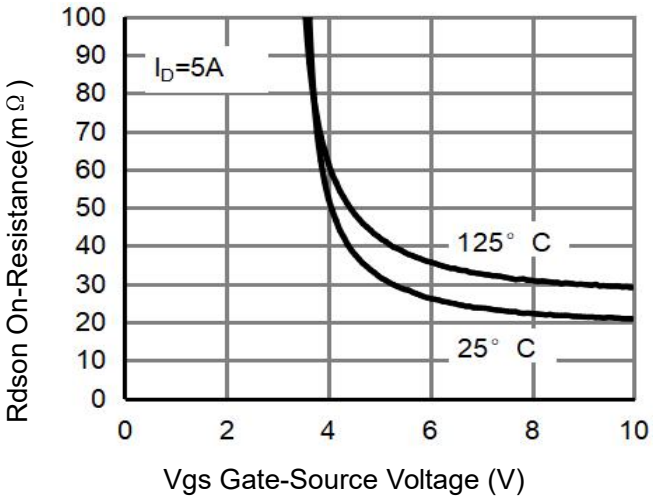


Figure7 Rdson vs Vgs

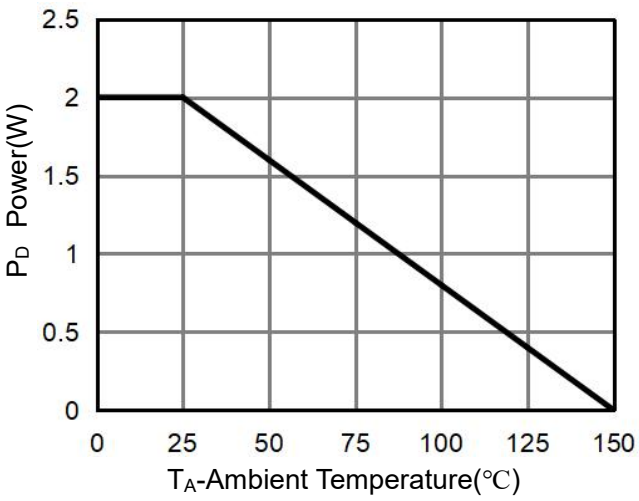


Figure 8 Power Dissipation

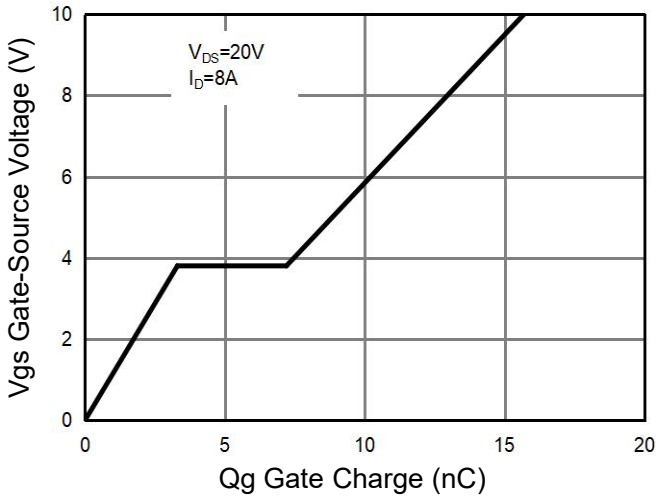


Figure 9 Gate Charge

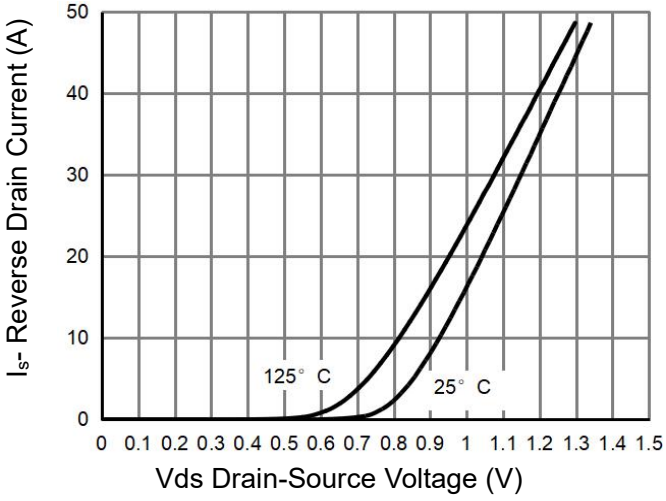


Figure 10 Source- Drain Diode Forward

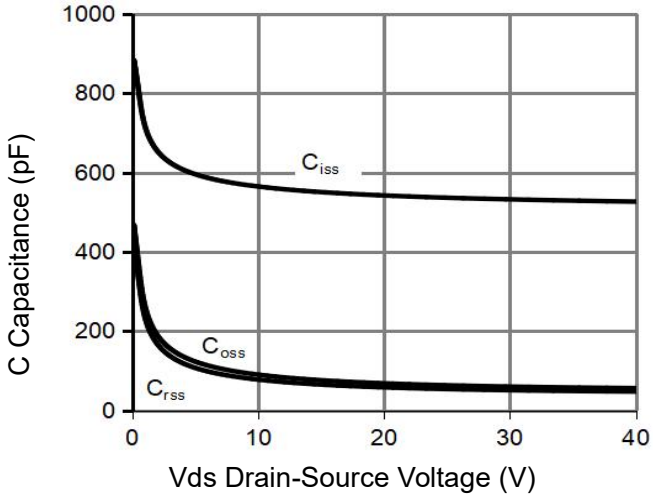


Figure 11 Capacitance vs Vds

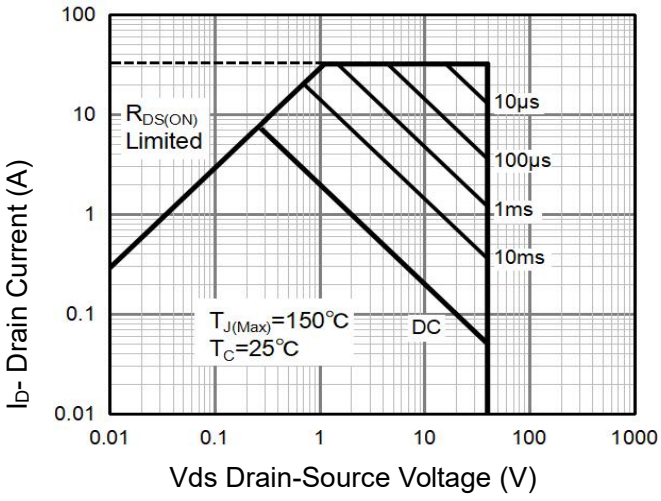


Figure 12 Safe Operation Area

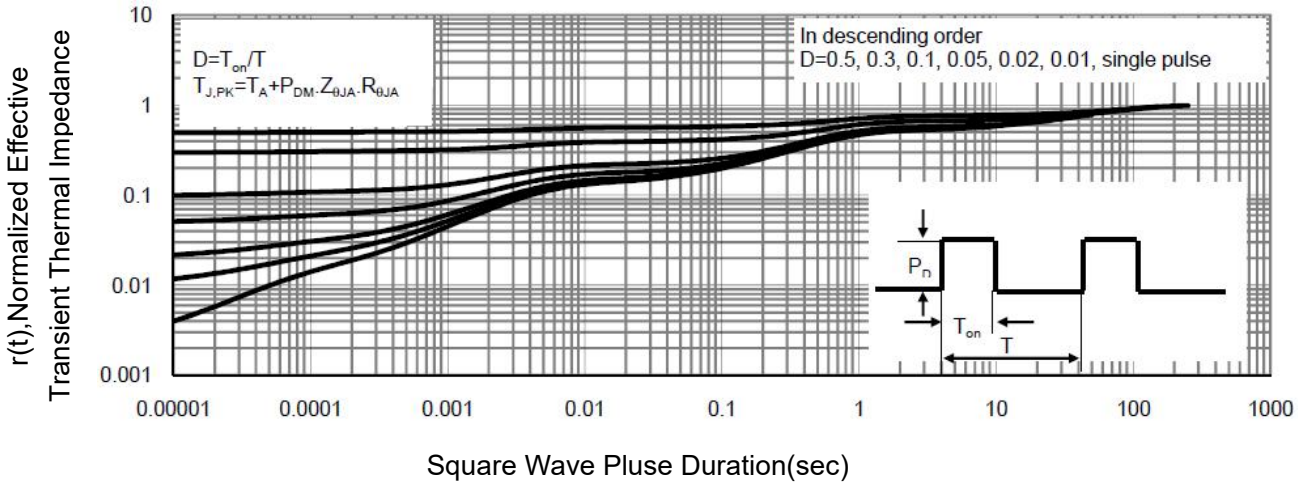


Figure 13 Normalized Maximum Transient Thermal Impedance

P- Channel Typical Electrical and Thermal Characteristics (Curves)

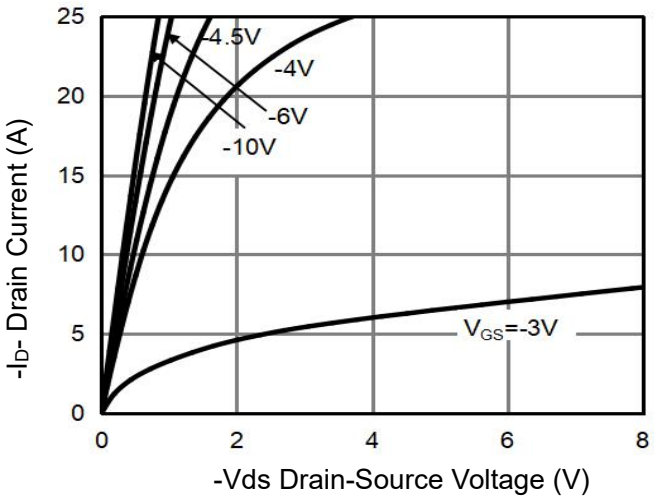


Figure 1 Output Characteristics

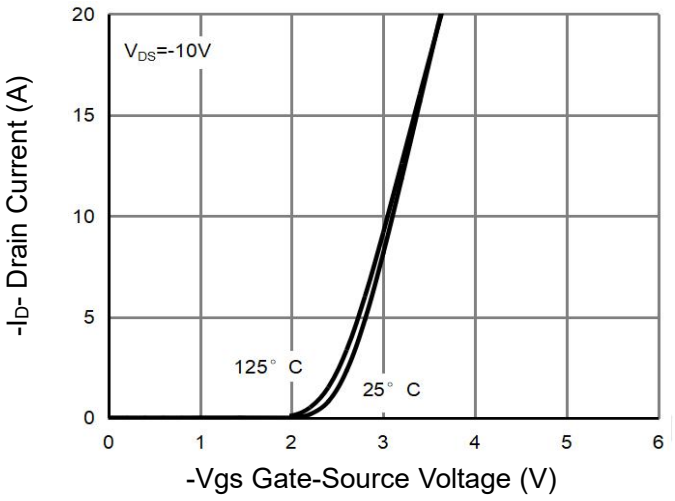


Figure 2 Transfer Characteristics

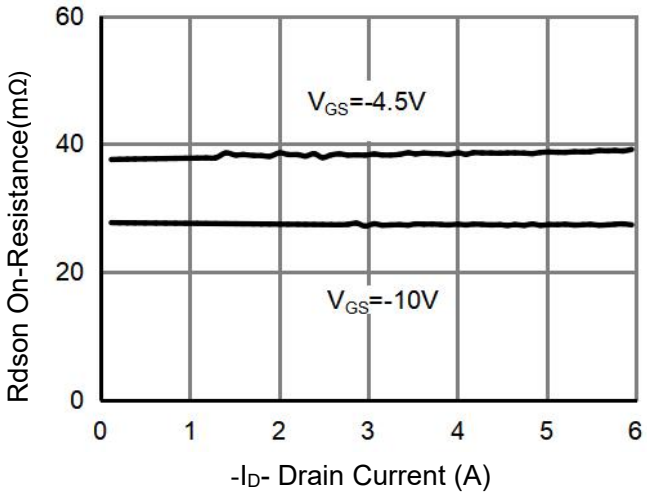


Figure 3 Rdson- Drain Current

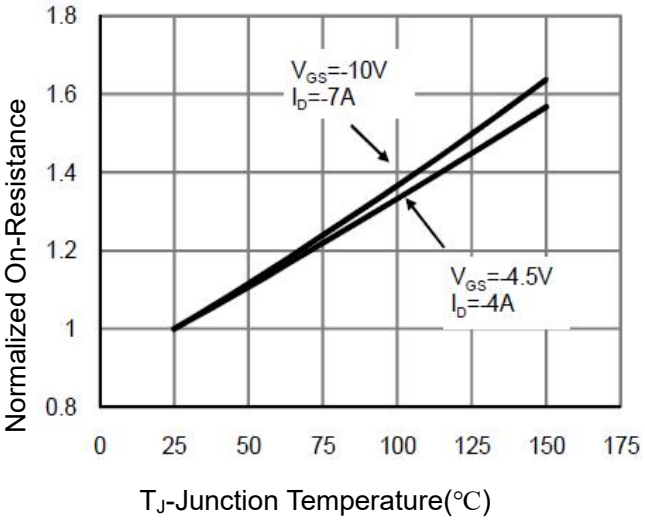


Figure 4 Rdson-Junction Temperature

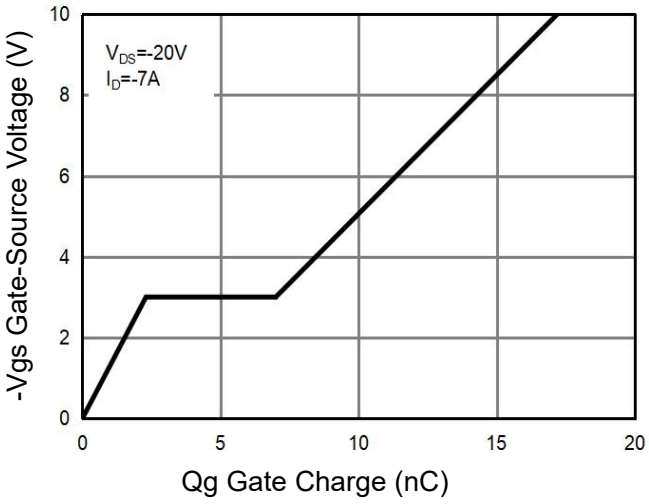


Figure 5 Gate Charge

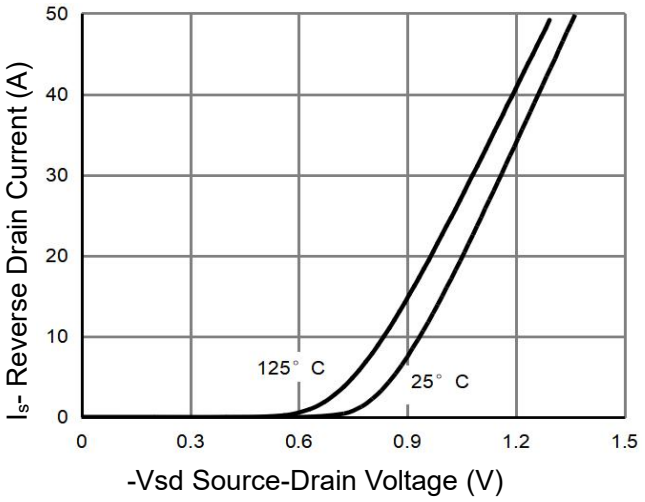


Figure 6 Source- Drain Diode Forward

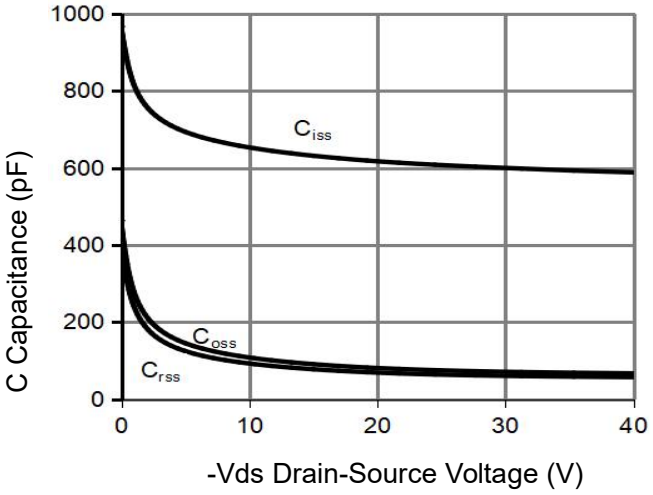


Figure 7 Capacitance vs Vds

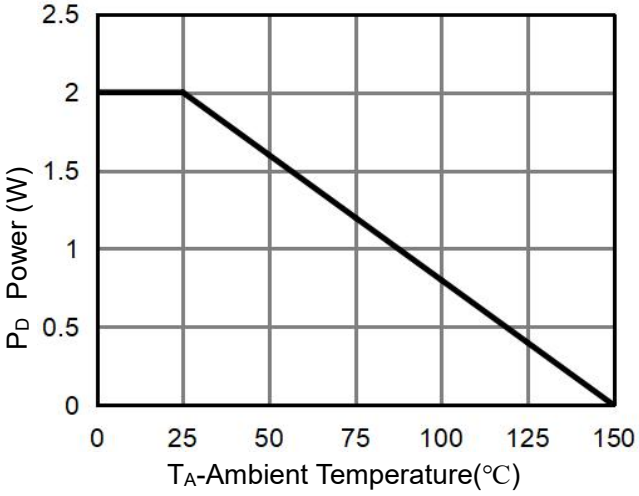


Figure 9 Power Dissipation

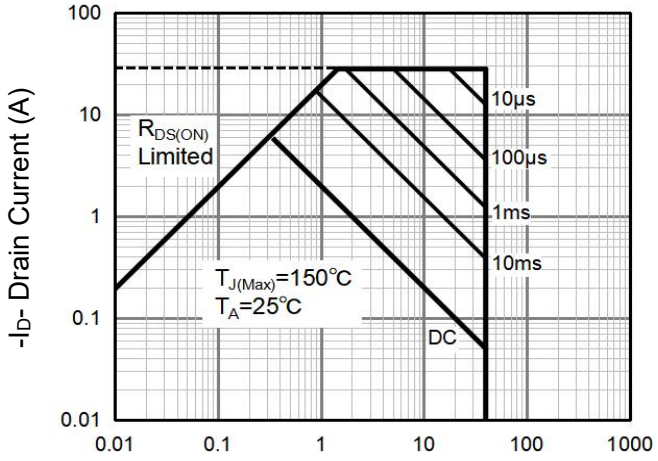


Figure 8 Safe Operation Area

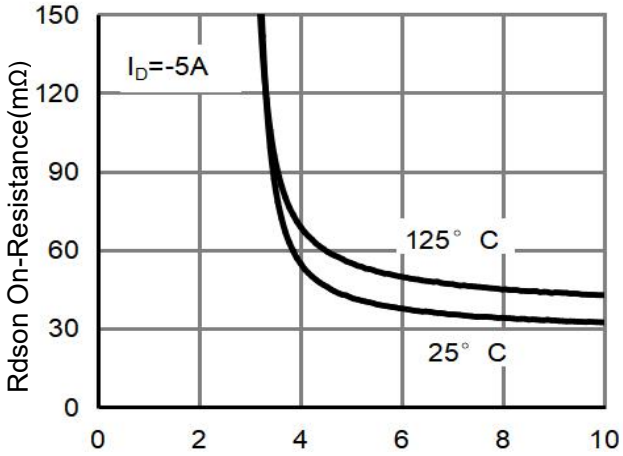


Figure10 Rdson vs Vgs

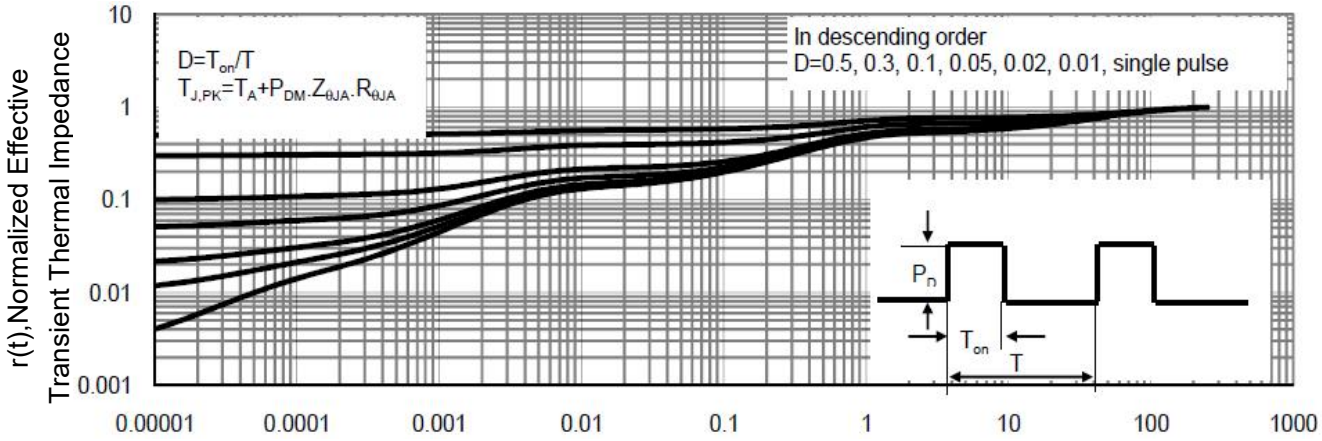
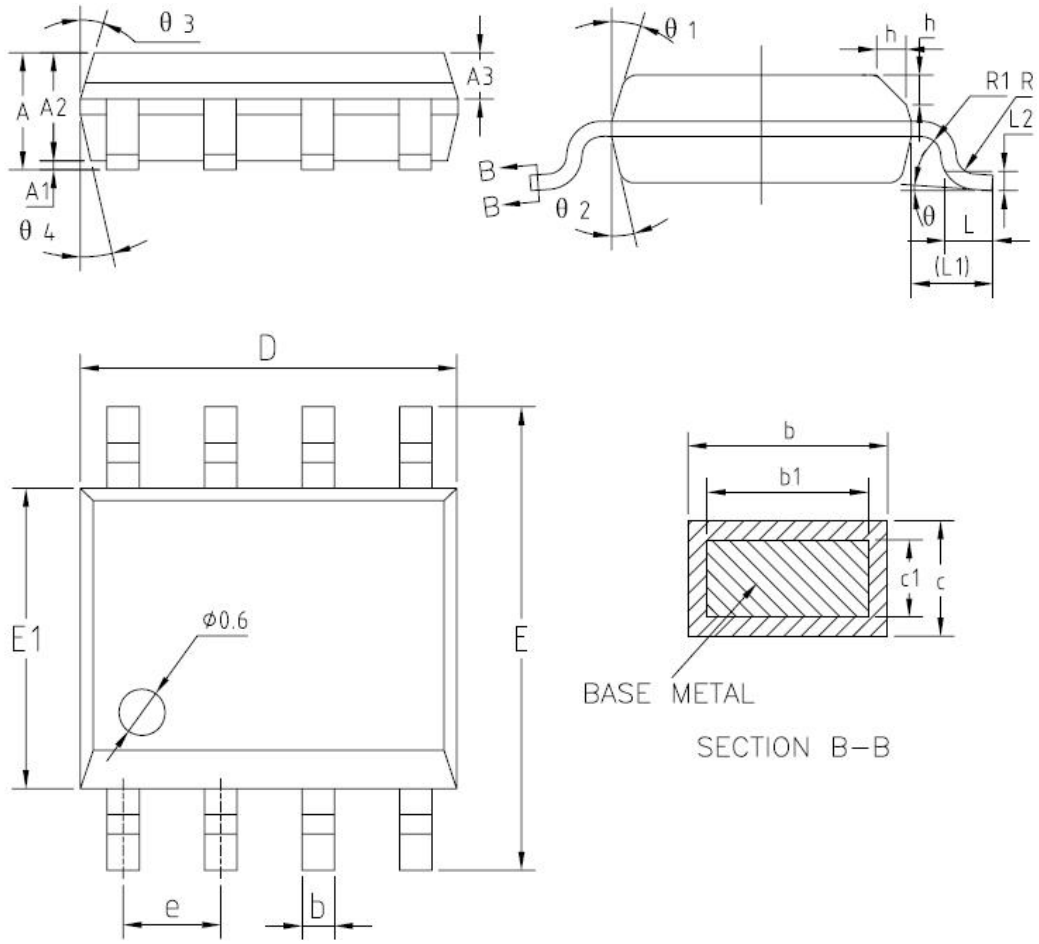


Figure 11 Normalized Maximum Transient Thermal Impedance

SOP-8 Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.38	–	0.51
b1	0.37	0.42	0.47
c	0.18	–	0.25
c1	0.17	0.20	0.23
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.17	1.27	1.37
L	0.45	0.60	0.80
L1		1.04REF	
L2		0.25BSC	
R	0.07	–	–
R1	0.07	–	–
h	0.30	0.40	0.50
θ	0°	–	8°
θ 1	15°	17°	19°
θ 2	11°	13°	15°
θ 3	15°	17°	19°
θ 4	11°	13°	15°

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