

N and P-Channel Enhancement Mode Power MOSFET

Description

The NCE30NP1812K 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

$$V_{DS} = 30V, I_D = 18A$$

$$R_{DS(ON)} < 41m\Omega @ V_{GS}=10V$$

$$R_{DS(ON)} < 54m\Omega @ V_{GS}=4.5V$$

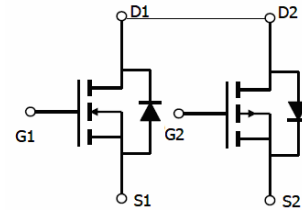
● P-Channel

$$V_{DS} = -30V, I_D = -12A$$

$$R_{DS(ON)} < 58m\Omega @ V_{GS}=-10V$$

$$R_{DS(ON)} < 85m\Omega @ V_{GS}=-4.5V$$

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



Schematic diagram



Marking and pin assignment

100% UIS TESTED!

100% ΔV_{ds} TESTED!

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
NCE30NP1812K	NCE30NP1812K	TO-252-4L	-	-	-

Absolute Maximum Ratings ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	N-Channel	P-Channel	Unit
Drain-Source Voltage	V_{DS}	30	-30	V
Gate-Source Voltage	V_{GS}	± 12	± 12	V
Continuous Drain Current	I_D	$T_A=25^\circ C$	18	-12
		$T_A=70^\circ C$	14.4	-8.5
Pulsed Drain Current ^(Note 1)	I_{DM}	72	-48	A
Maximum Power Dissipation	P_D	25	25	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Case ^(Note2)	$R_{\theta JC}$	N-Ch	5	$^\circ C/W$
Thermal Resistance, Junction-to-Case ^(Note2)	$R_{\theta JC}$	P-Ch	5	$^\circ C/W$

N-CH Electrical Characteristics ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=30V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1	1.5	2.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=10V, I_D=10A$	-	36	41	m Ω
		$V_{GS}=4.5V, I_D=10A$	-	45	54	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=10A$		10	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{iss}	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	519.9	-	PF
Output Capacitance	C_{oss}		-	55.5	-	PF
Reverse Transfer Capacitance	C_{rss}		-	49.3	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, R_L=1.5\Omega$ $V_{GS}=10V, R_{GEN}=3\Omega$	-	5	-	nS
Turn-on Rise Time	t_r		-	3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	3	-	nS
Total Gate Charge	Q_g	$V_{DS}=15V, I_D=10A,$ $V_{GS}=10V$	-	14.7	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	nC
Gate-Drain Charge	Q_{gd}		-	3.0	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=10A$	-	0.8	1.2	V

P-CH Electrical Characteristics ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-30V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.0	-1.5	-2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-10V, I_D=-12A$	-	50	58	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	-	71	85	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-12A$	-	10	-	S
Dynamic Characteristics (Note 4)						
Input Capacitance	C_{ISS}	$V_{DS}=-15V, V_{GS}=0V,$ $F=1.0\text{MHz}$	-	464.7	-	PF
Output Capacitance	C_{OSS}		-	70.4	-	PF
Reverse Transfer Capacitance	C_{RSS}		-	53.8	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, R_L=1.25\Omega$ $V_{GS}=-10V, R_{GEN}=6\Omega$	-	5	-	nS
Turn-on Rise Time	t_r		-	3	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	4	-	nS
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-12A$ $V_{GS}=-10V$	-	12.6	-	nC
Gate-Source Charge	Q_{gs}		-	2.1	-	nC
Gate-Drain Charge	Q_{gd}		-	3.0	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=-12A$	-	-	-1.2	V

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.
2. Surface Mounted on FR4 Board, $t \leq 10$ sec.
3. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$.
4. Guaranteed by design, not subject to production

N- Channel Typical Electrical and Thermal Characteristics (Curves)

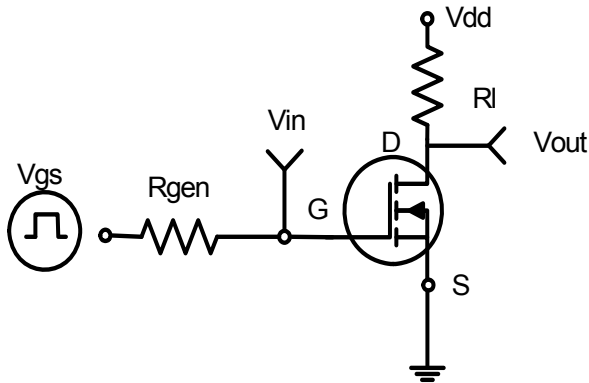


Figure 1: Switching Test Circuit

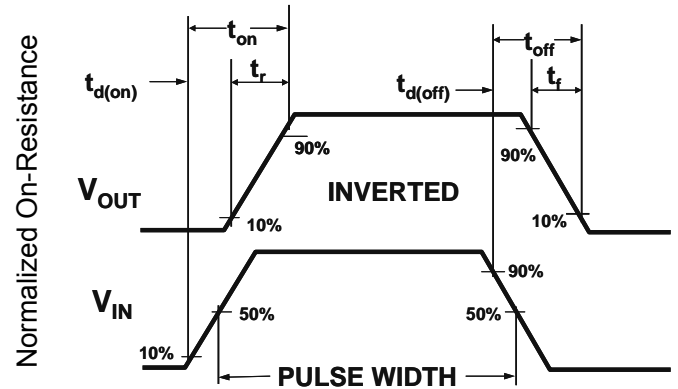


Figure 2: Switching Waveforms

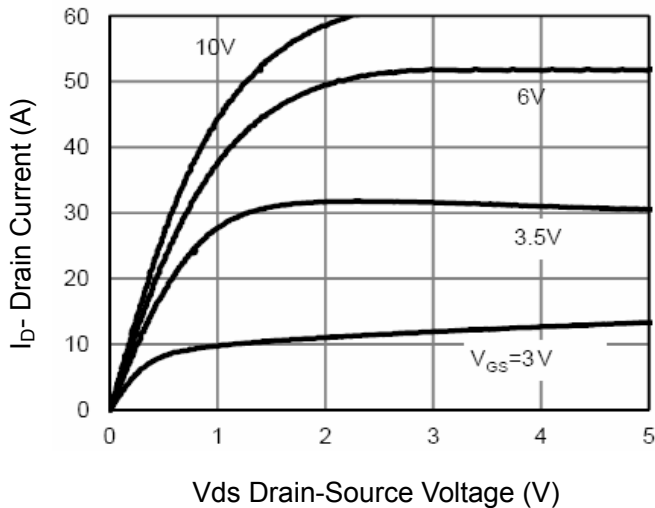


Figure 3 Output Characteristics

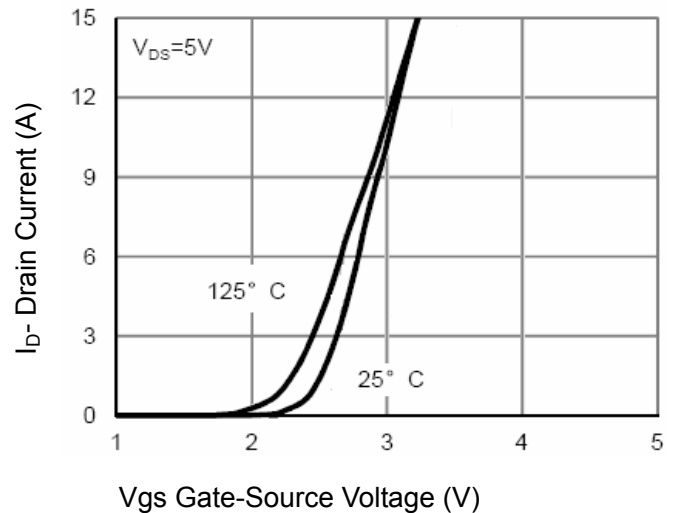


Figure 4 Transfer Characteristics

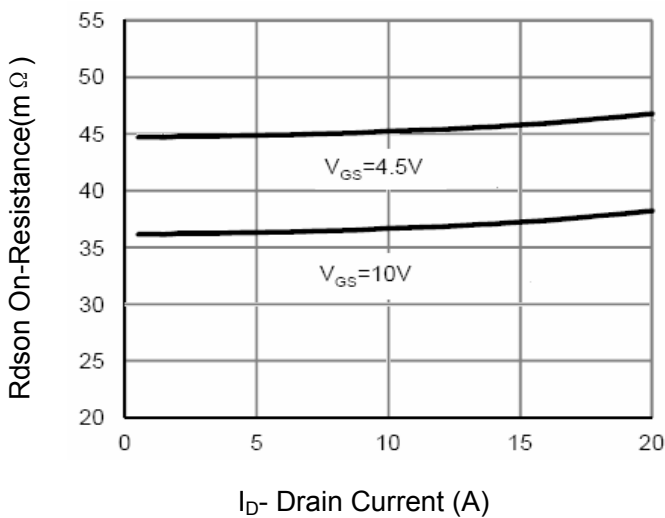


Figure 5 Drain-Source On-Resistance

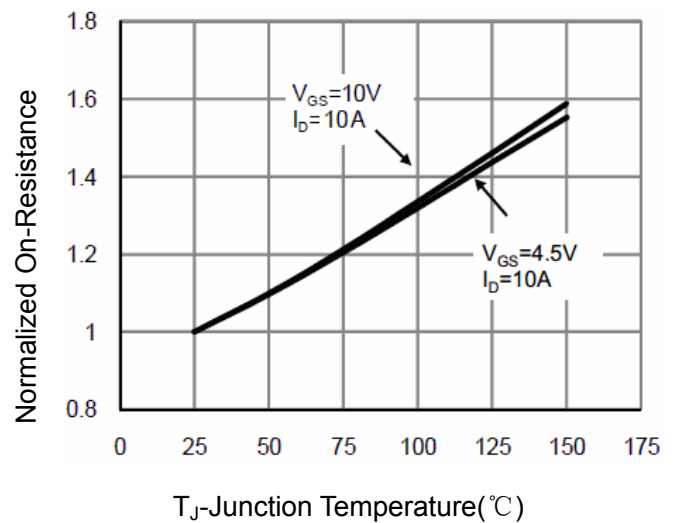


Figure 6 Drain-Source On-Resistance

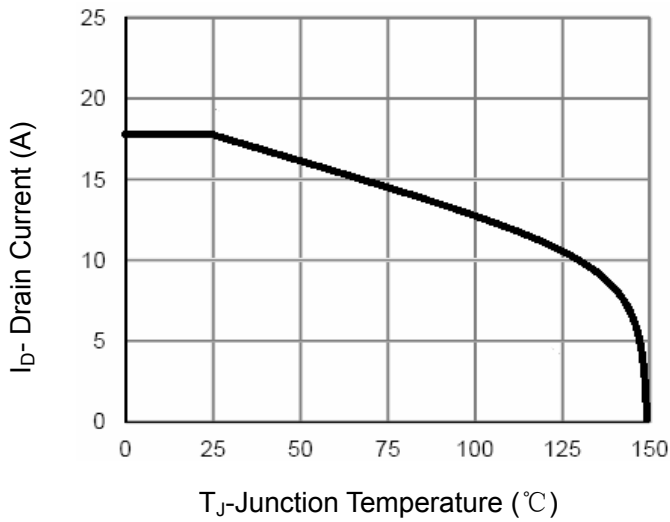


Figure 7 Current De-rating

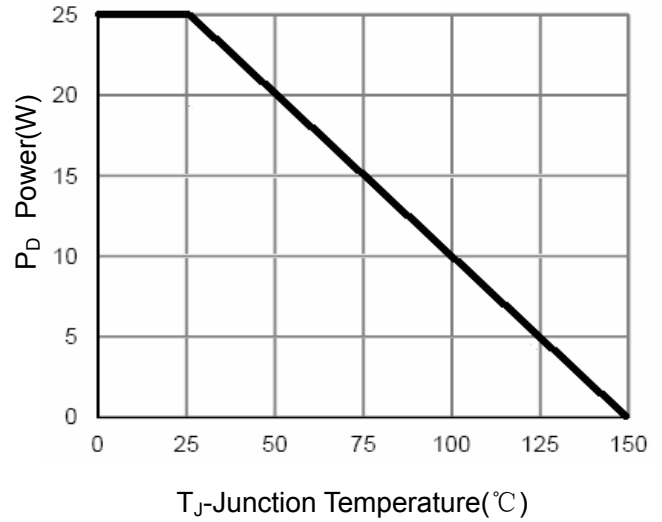


Figure 8 Power Dissipation

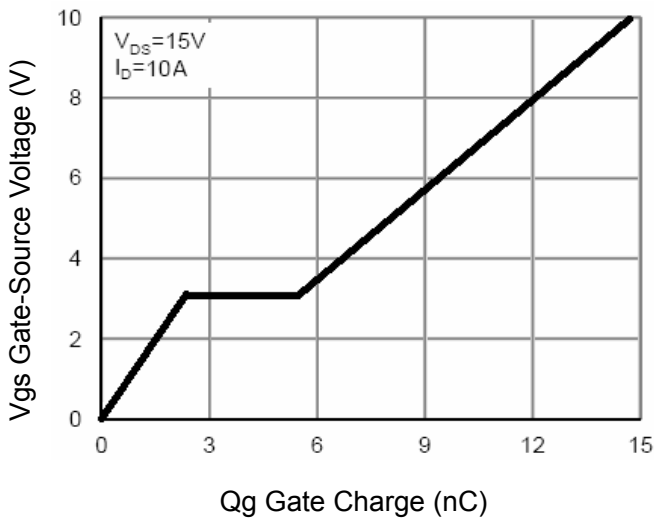


Figure 9 Gate Charge

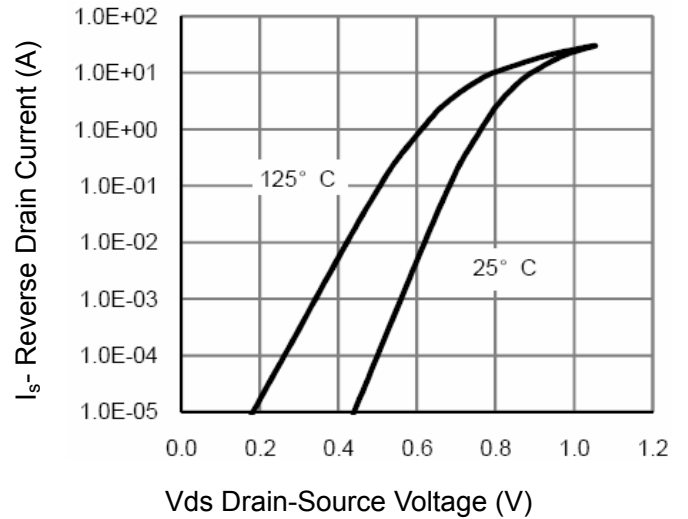


Figure 10 Source- Drain Diode Forward

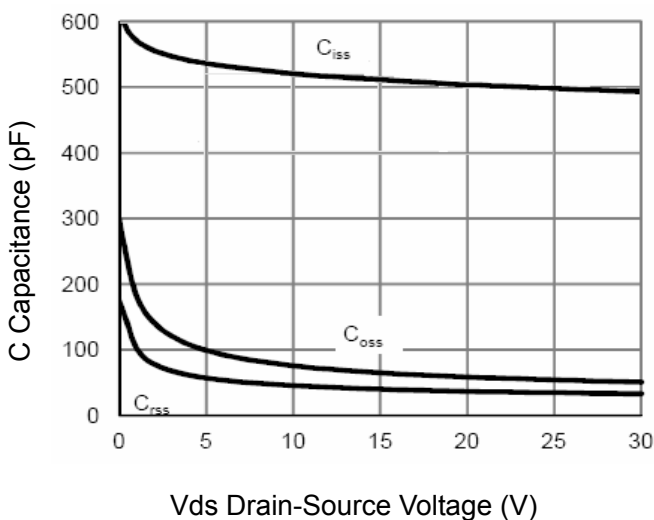


Figure 11 Capacitance vs Vds

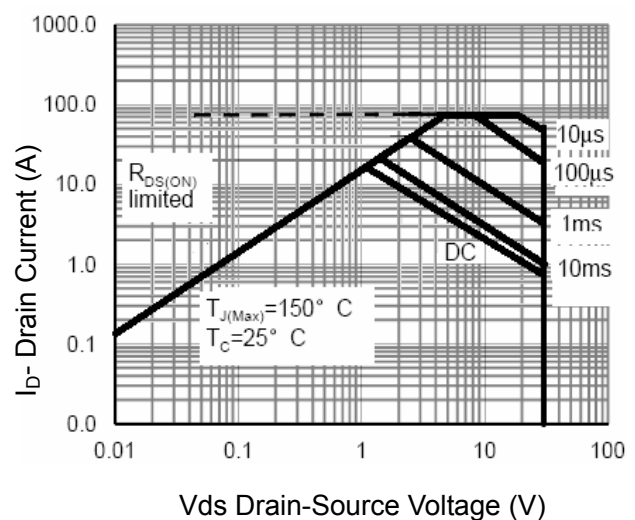


Figure 12 Safe Operation Area

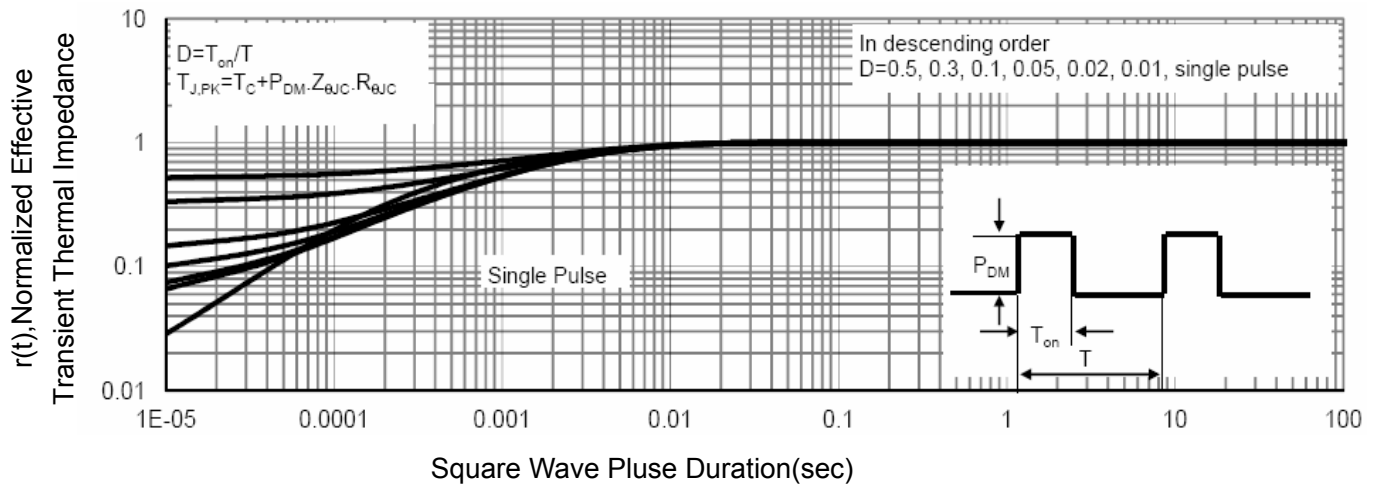


Figure 13 Normalized Maximum Transient Thermal Impedance

P- Channel Typical Electrical and Thermal Characteristics (Curves)

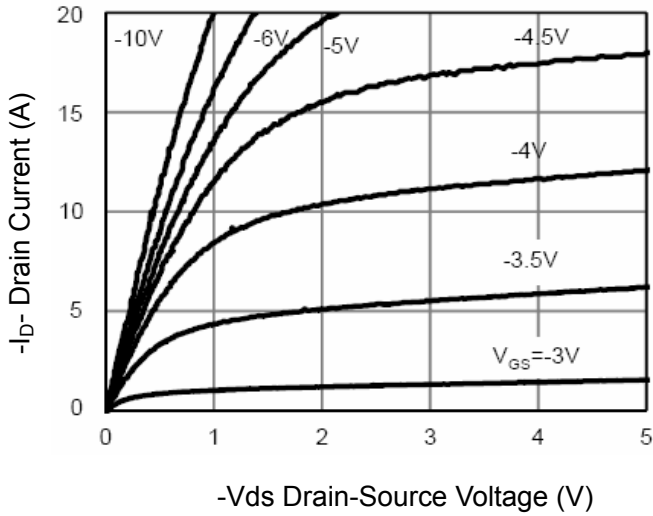


Figure 1 Output Characteristics

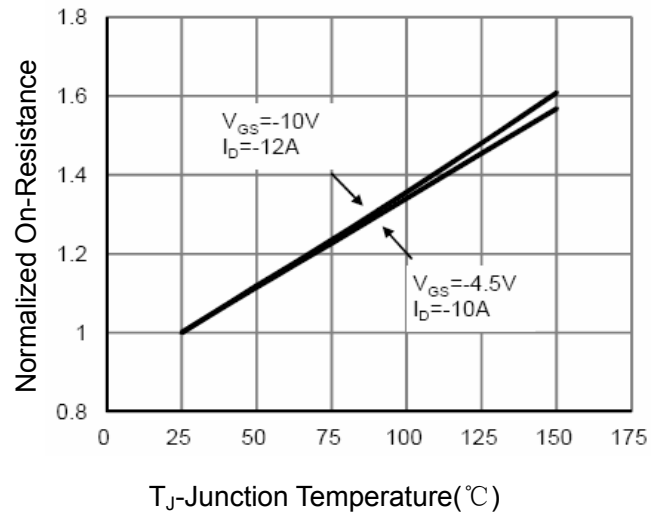


Figure 4 Rdson-Junction Temperature

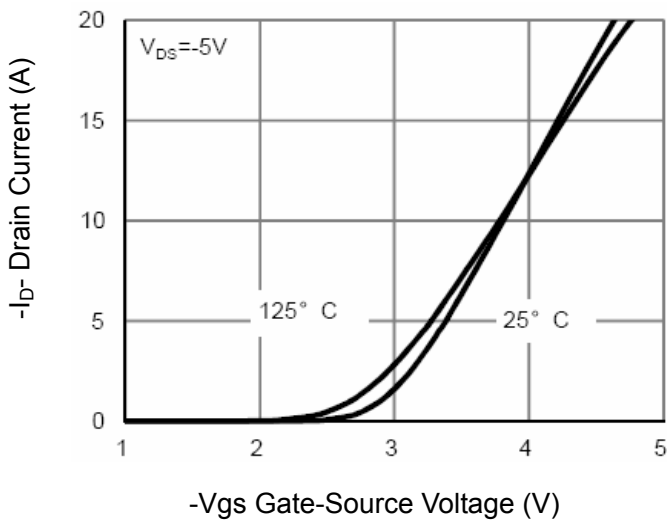


Figure 2 Transfer Characteristics

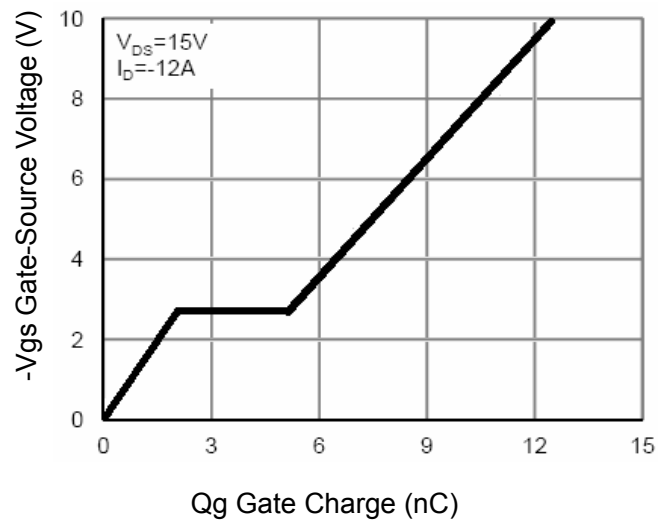


Figure 5 Gate Charge

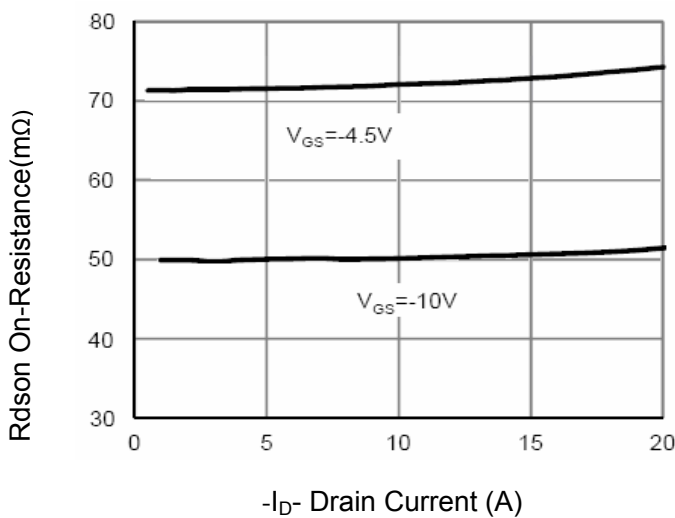


Figure 3 Rdson- Drain Current

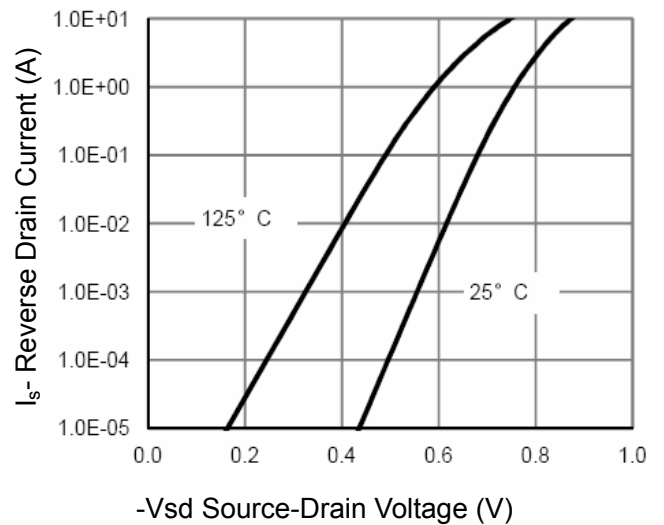
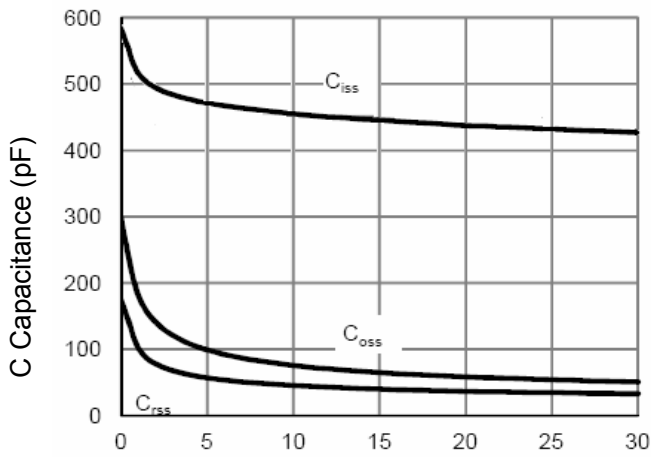
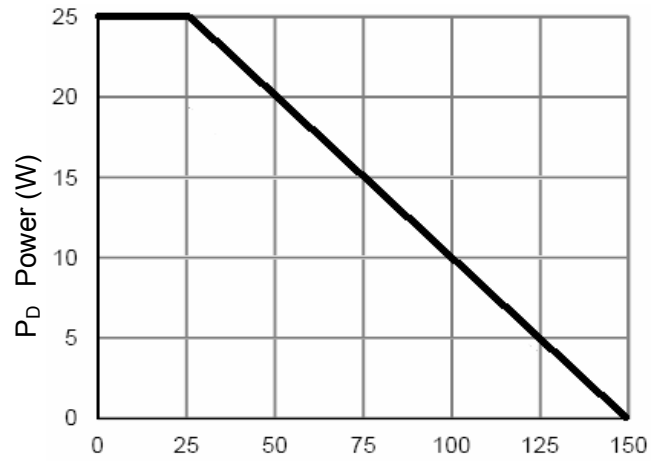


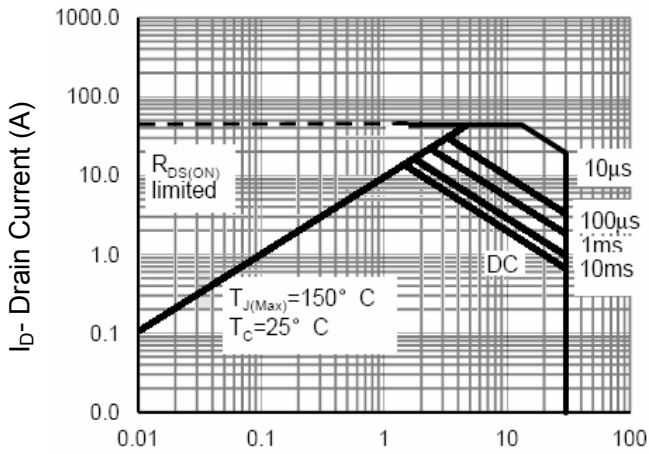
Figure 6 Source- Drain Diode Forward



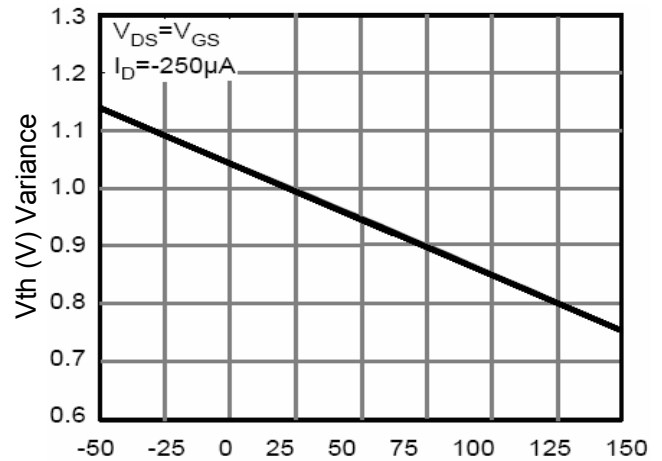
-Vds Drain-Source Voltage (V)
Figure 7 Capacitance vs Vds



T_J -Junction Temperature ($^{\circ}C$)
Figure 9 Power Dissipation



-Vds Drain-Source Voltage (V)
Figure 8 Safe Operation Area



T_J -Junction Temperature ($^{\circ}C$)
Figure 10 $V_{GS(th)}$ vs Junction Temperature

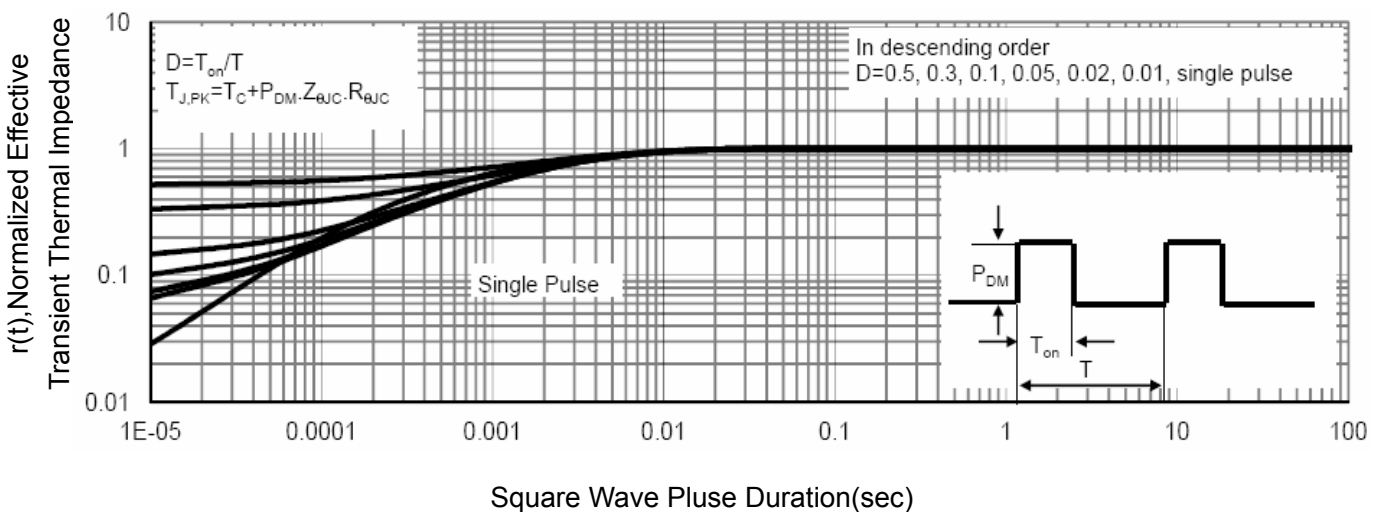
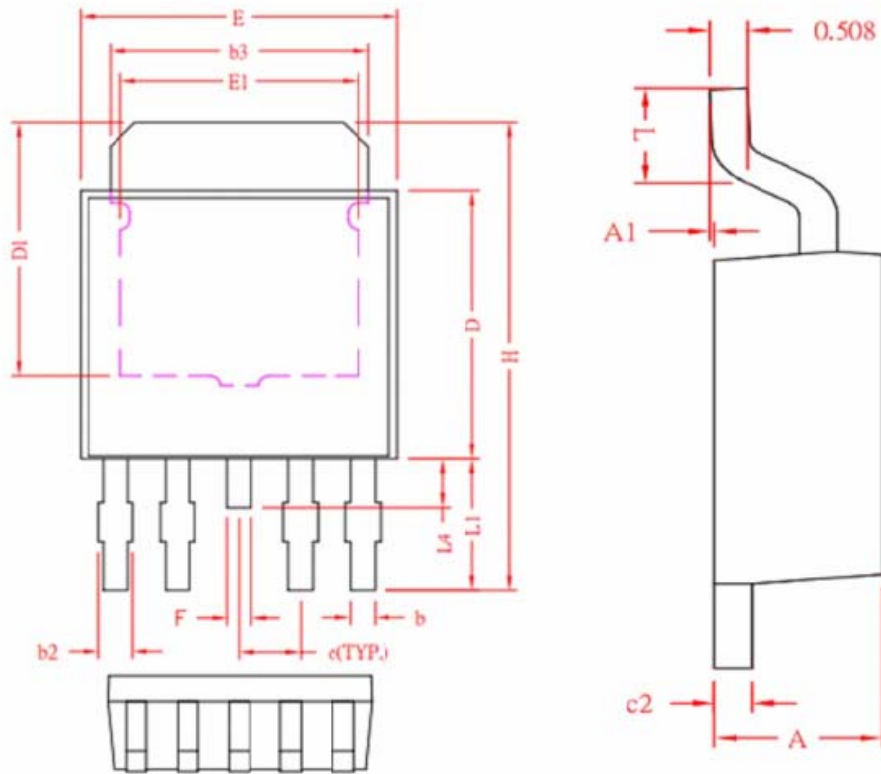


Figure 11 Normalized Maximum Transient Thermal Impedance

TO-252-4L Package Information



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0	0.08	0.15
b	0.45	0.53	0.60
b2	0.50	0.65	0.80
b3	5.20	5.35	5.50
c2	0.45	0.50	0.55
D	5.40	5.60	5.80
D1	4.57	-	-
E	6.40	6.60	6.80
E1	3.81	-	-
e	1.27 REF.		
F	0.40	0.50	0.60
H	9.40	9.80	10.20
L	1.40	1.59	1.77
L1	2.40	2.70	3.00
L4	0.80	1.00	1.20

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