NCE N-Channel Enhancement Mode Power MOSFET

Description

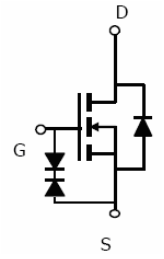
The NCE1012E uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a Battery protection or in other Switching application.

General Features

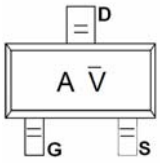
- V_{DS} = 20V,I_D =0.6A
  $R_{DS(ON)}$ <220mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$ <495mΩ @ V_{GS}=2.5V
  $R_{DS(ON)}$ <700mΩ @ V_{GS}=1.8V
  ESD Rating : HBM 2000V
- High power and current handing capability
- Lead free product is acquired
- Gate-Source ESD protection

Application

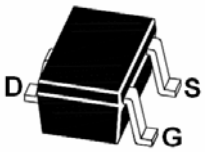
- Battery operated systems
- Load/ power switching cell phones pagers
- Power supply converter circuits



Schematic diagram



Marking and pin assignment



SOT-523 top view

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
A V̄	NCE1012E	SOT-523	Ø180mm	8 mm	3000units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous	I_D	0.6	A
Drain Current-Pulsed (Note 1)	I_{DM}	4	A
Maximum Power Dissipation	P_D	0.3	W
Operating Junction and Storage Temperature Range	T_J,T_{STG}	-55 To 150	℃

Thermal Characteristic

Thermal Resistance,Junction-to-Ambient (Note 2)	$R_{\theta JA}$	417	℃/W

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	20	22	-	V

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=16V,V_{GS}=0V	-	-	100	nA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±4.5V,V_{DS}=0V	-	-	±1	μA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS},I_D=250μA	0.5	0.75	1.2	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=0.6A	-	170	220	mΩ
		V_{GS}=2.5V, I_D=0.5A	-	230	495	mΩ
		V_{GS}=1.8V, I_D=0.15A	-	320	700	mΩ
Forward Transconductance	g_{FS}	V_{DS}=10V,I_D=0.5A	-	1	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{lss}	V_{DS} = 10 V ,V_{GS} = 0 V, F= 1.0 MHz,	-	60	-	pF
Output Capacitance	C_{oss}		-	15	-	pF
Reverse Transfer Capacitance	C_{rss}		-	5	-	pF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}= 10 V, R_L = 47Ω V_G= 4.5 V, R_G = 10Ω	-	5	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	25	-	nS
Turn-Off Fall Time	t_f		-	11	-	nS
Total Gate Charge	Q_g	V_{DS} = 10 V, V_{GS} = 4.5 V, I_D = 250 mA	-	750	-	pC
Gate-Source Charge	Q_{gs}		-	75	-	pC
Gate-Drain Charge	Q_{gd}		-	225	-	pC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	V_{GS}=0V,I_S=0.6A	-	0.75	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	0.6	A

Notes:

1. Repetitive Rating: Pulse width limited by maximum junction temperature.

2. Surface Mounted on 1in 2 FR-4 board with 2oz. Copper, in a still air environment with T A =25°C.The value in any given application depends on the user's specific board design. The current rating is based on the t≤ 10s thermal resistance rating.

3. Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.

4. Guaranteed by design, not subject to production

Typical Electrical and Thermal Characteristics

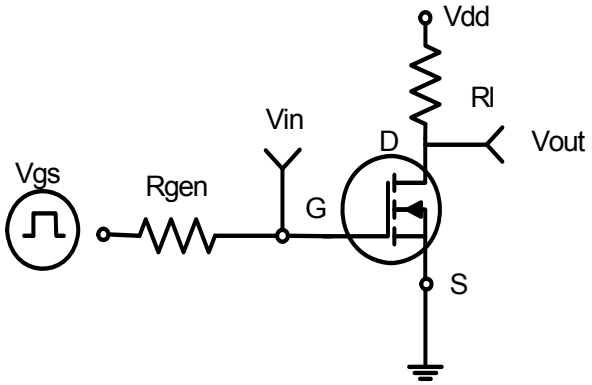


Figure 1:Switching Test Circuit

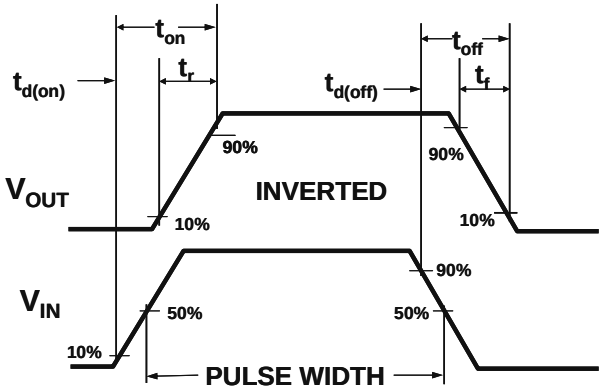
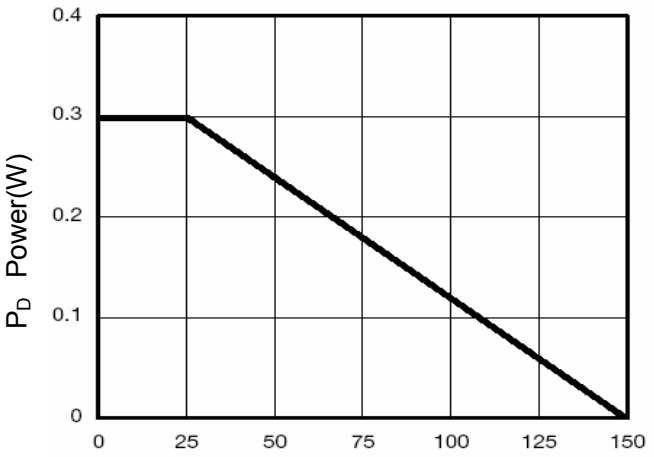
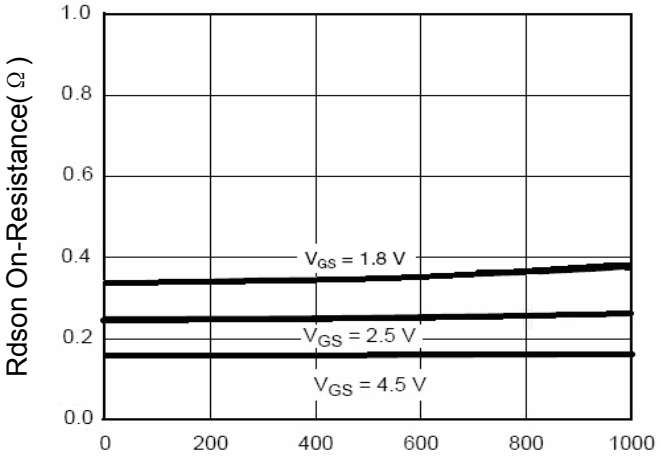


Figure 2:Switching Waveforms



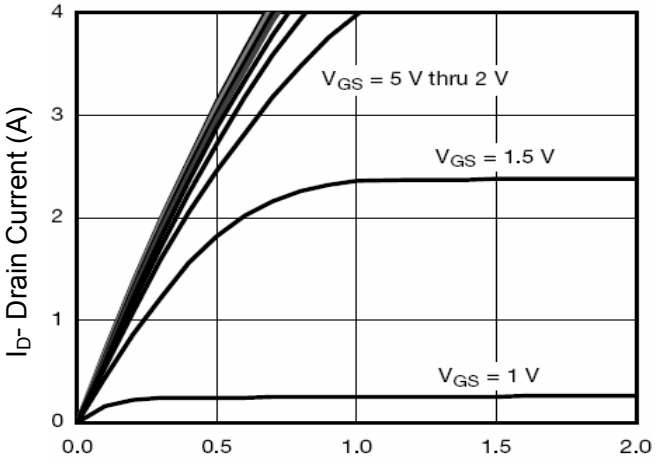
TJ-Junction Temperature(℃)

Figure 3 Power Dissipation



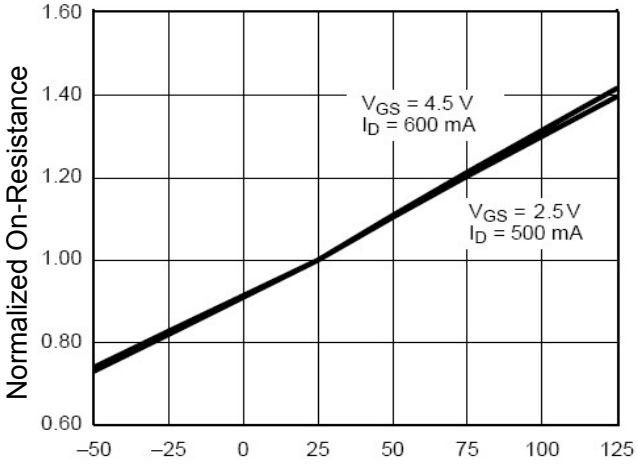
ID- Drain Current (mA)

Figure 4 Drain-Source On-Resistance



Vds Drain-Source Voltage (V)

Figure 5 Output Characteristics



TJ-Junction Temperature(℃)

Figure 6 Drain-Source On-Resistance

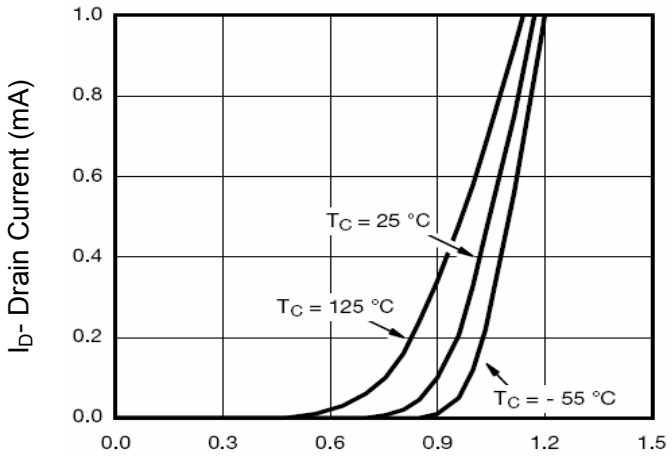


Figure 7 Transfer Characteristics

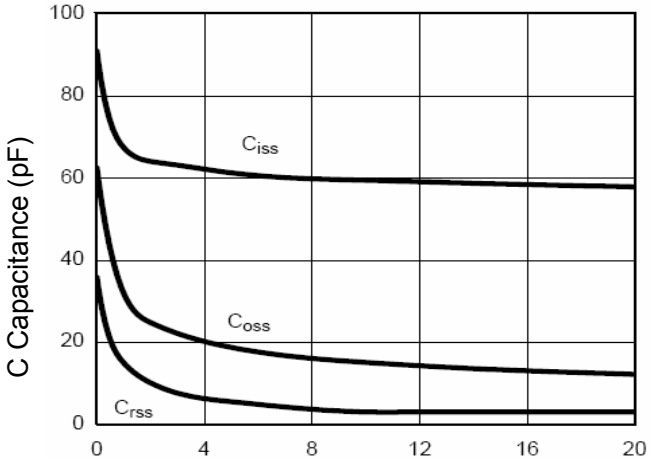


Figure 8 Capacitance vs Vds

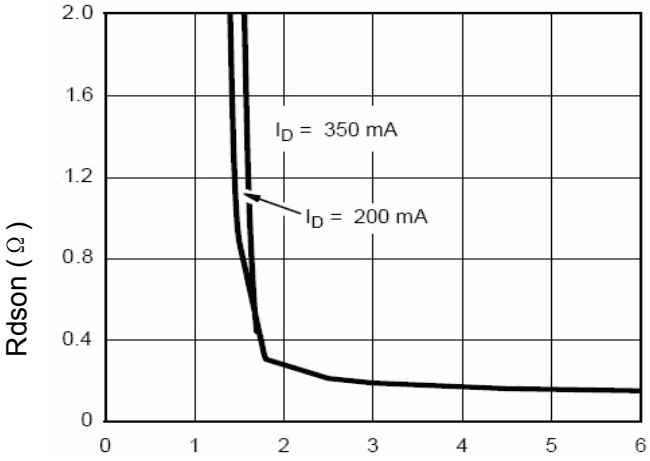


Figure 9 Rdson vs Vgs

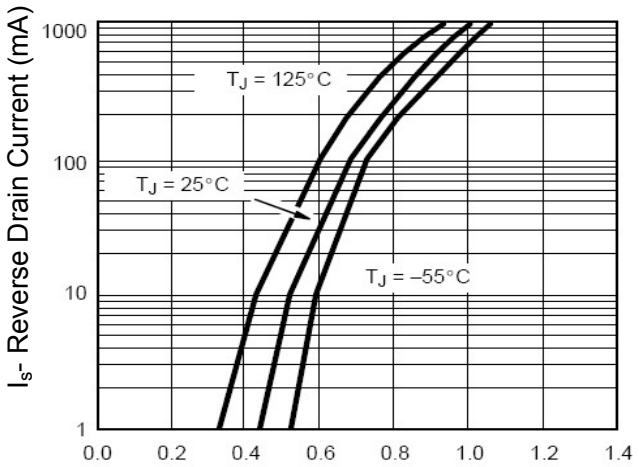


Figure 10 Source- Drain Diode Forward

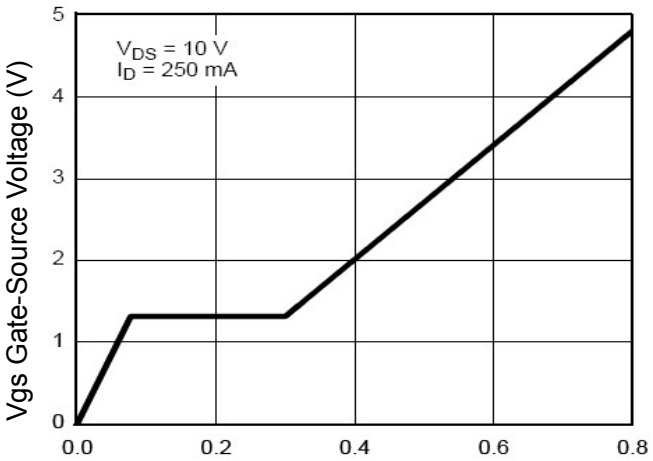


Figure 11 Gate Charge

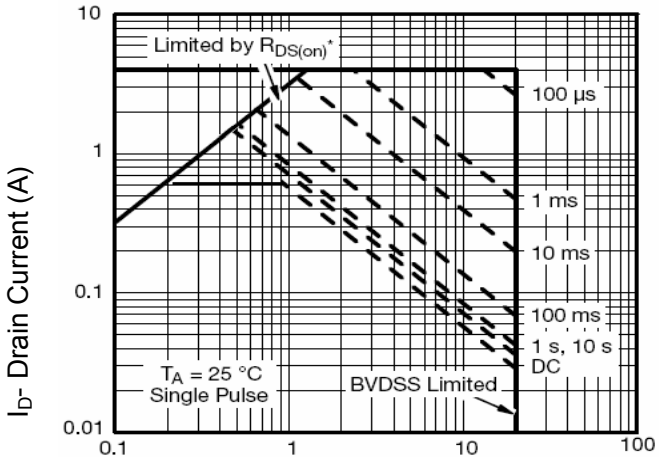


Figure 12 Safe Operation Area

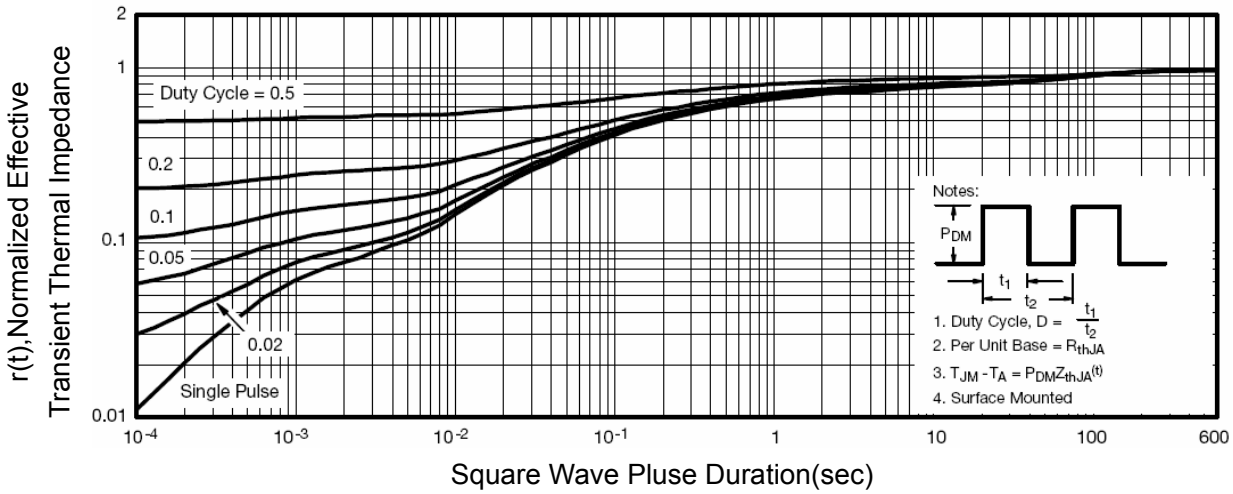
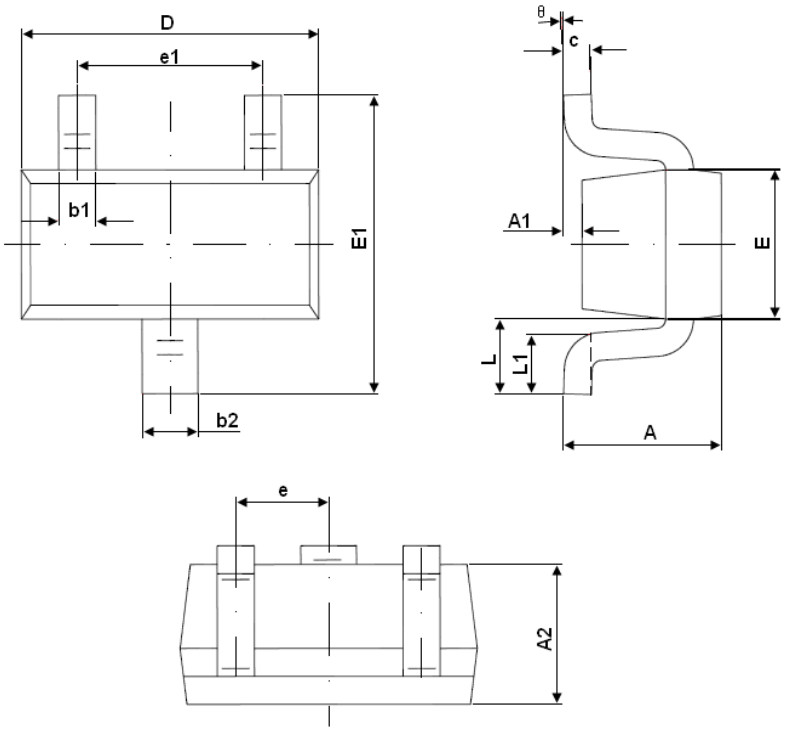


Figure 13 Normalized Maximum Transient Thermal Impedance

SOT-523 Package Information



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.900	0.028	0.035
A1	0.000	0.100	0.000	0.004
A2	0.700	0.800	0.028	0.031
b1	0.150	0.250	0.006	0.010
b2	0.250	0.350	0.010	0.014
c	0.100	0.200	0.004	0.008
D	1.500	1.700	0.059	0.067
E	0.700	0.900	0.028	0.035
E1	1.450	1.750	0.057	0.069
e	0.500 TYP.		0.020 TYP.	
e1	0.900	1.100	0.035	0.043
L	0.400REF.		0.016REF.	
L1	0.260	0.460	0.010	0.018
θ°	0°	8°	0°	8°

Notes

1. All dimensions are in millimeters.
2. Tolerance ±0.10mm (4 mil) unless otherwise specified
3. Package body sizes exclude mold flash and gate burrs. Mold flash at the non-lead sides should be less than 5 mils.
4. Dimension L is measured in gauge plane.
5. Controlling dimension is millimeter, converted inch dimensions are not necessarily exact.

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