NCE N-Channel Enhancement Mode Power MOSFET

Description

The NCE6003Y uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a Battery protection or in other switching application.
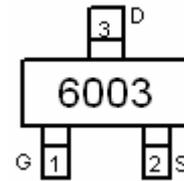
General Features

- V_{DS} =60V, I_D =3A

    $R_{DS(ON)}$ <105mΩ @ V_{GS}=10V

    $R_{DS(ON)}$ < 125mΩ @ V_{GS}=4.5V

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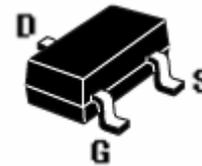- Lead free product is acquired
- Surface mount package

Application

- Battery switch
- DC/DC converter
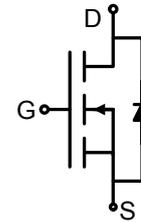
Schematic Diagram

Marking and Pin Assignment

SOT-23 -3L Top View

Package Marking and Ordering Information

Device Marking	Device	Device Package	Reel Size	Tape width	Quantity
6003	NCE6003Y	SOT-23-3L	Ø180mm	8 mm	3000 units

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous	I_D	3	A
Drain Current-Pulsed [Note 1]	I_{DM}	10	A
Maximum Power Dissipation	P_D	1.7	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	℃

Thermal Characteristic

	Symbol		Unit
Thermal Resistance,Junction-to-Ambient [Note 2]	$R_{θJA}$	73.5	℃/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	60	65	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=60V, V_{GS}=0V	-	-	1	µA

Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm20V, V_{DS}=0V$	-	-	±100	nA
On Characteristics (Note 3)						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.3	2.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=10V, I_D=3A$	-	78	105	mΩ
		$V_{GS}=4.5V, I_D=3A$	-	95	125	mΩ
Forward Transconductance	g_{FS}	$V_{DS}=15V, I_D=2A$		3	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C_{Iss}	$V_{DS}=30V, V_{GS}=0V,$ F=1.0MHz	-	247	-	PF
Output Capacitance	C_{oss}		-	34	-	PF
Reverse Transfer Capacitance	C_{rss}		-	19.5	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=30V, I_D=1.5A$ $V_{GS}=10V, R_{GEN}=1\Omega$	-	6	-	nS
Turn-on Rise Time	t_r		-	15	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	15	-	nS
Turn-Off Fall Time	t_f		-	10	-	nS
Total Gate Charge	Q_g	$V_{DS}=30V, I_D=3A,$ $V_{GS}=4.5V$	-	6	-	nC
Gate-Source Charge	Q_{gs}		-	1	-	nC
Gate-Drain Charge	Q_{gd}		-	1.3	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V_{SD}	$V_{GS}=0V, I_S=3A$	-	-	1.2	V
Diode Forward Current (Note 2)	I_S		-	-	3	A

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
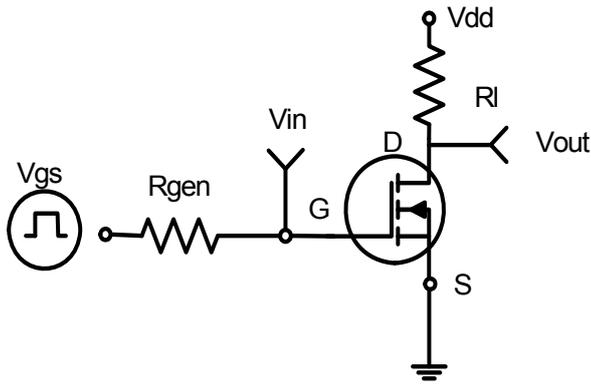
Typical Electrical and Thermal Characteristics
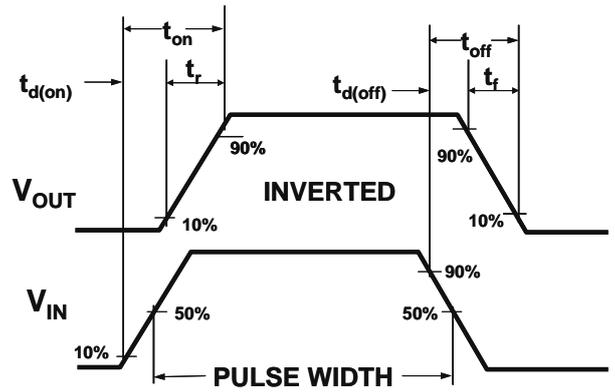

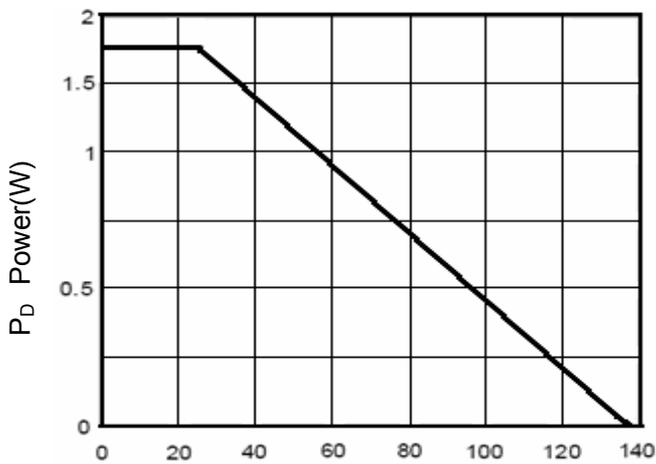**Figure 1:Switching Test Circuit**

Figure 2:Switching Waveforms

T_J-Junction Temperature(℃)

Figure 3 Power Dissipation

T_J-Junction Temperature(℃)

Figure 4 Drain Current

Vds Drain-Source Voltage (V)
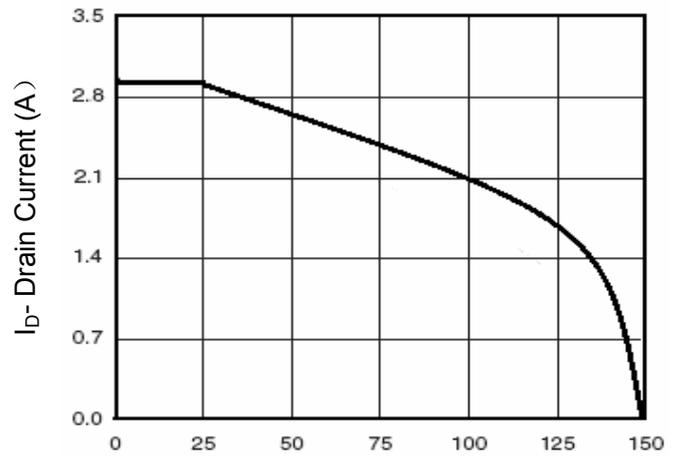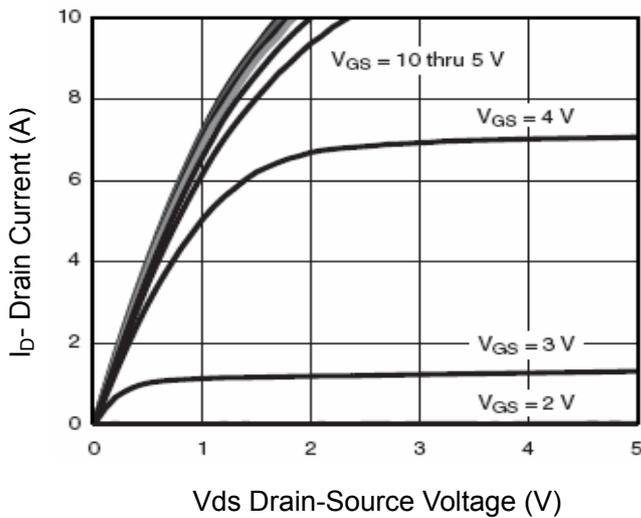
Figure 5 Output Characteristics

I_D- Drain Current (A)
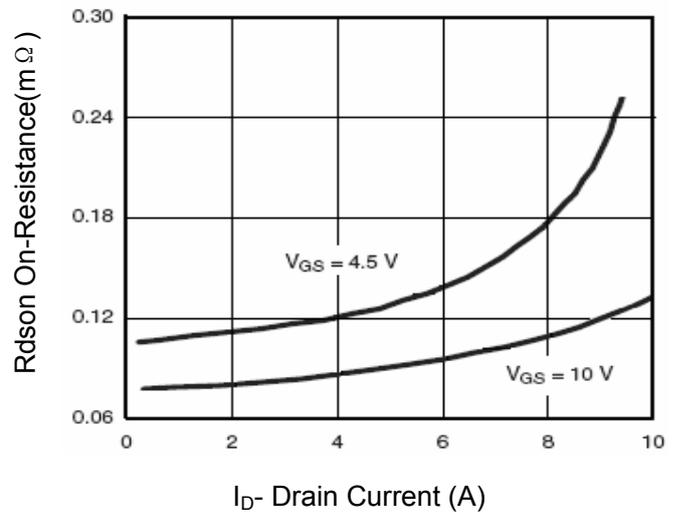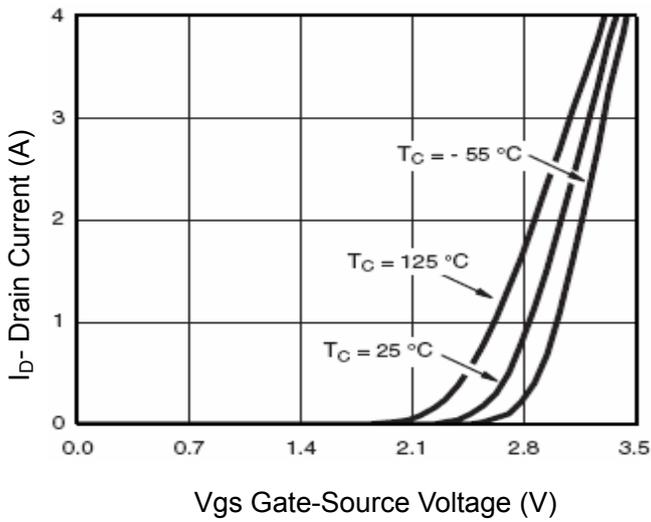
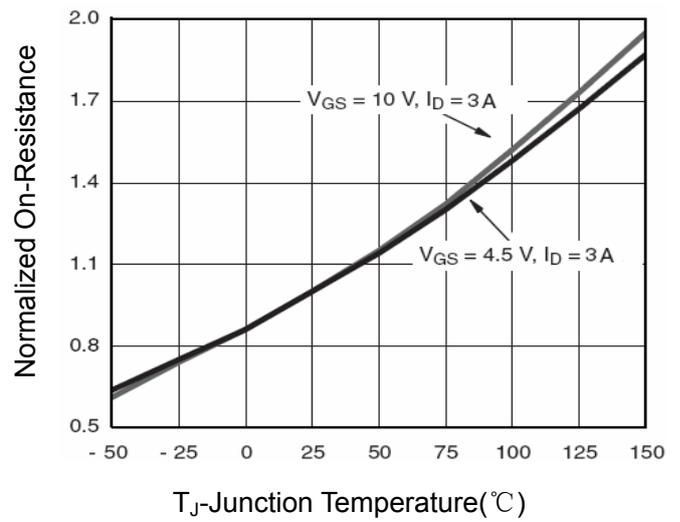**Figure 6 Drain-Source On-Resistance**

Figure 7 Transfer Characteristics

Figure 8 Drain-Source On-Resistance
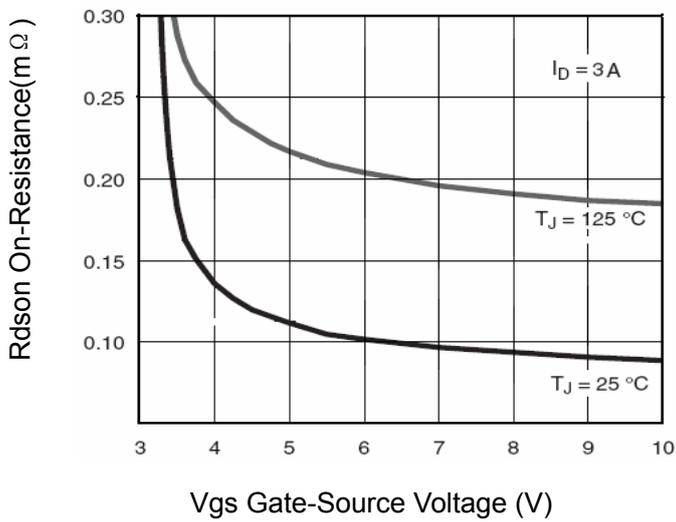
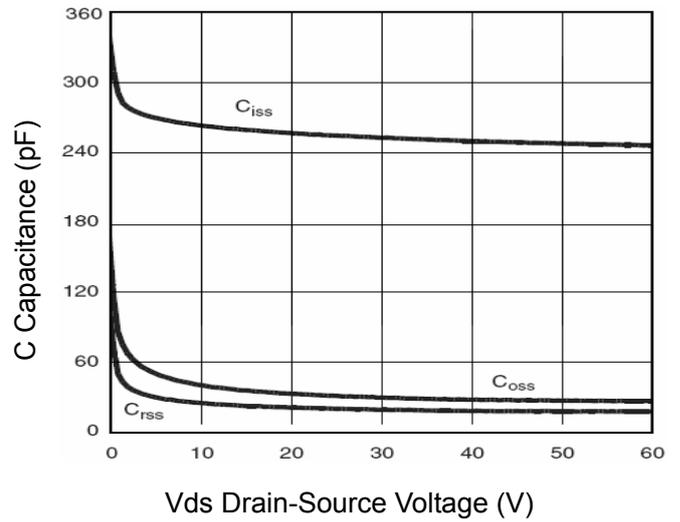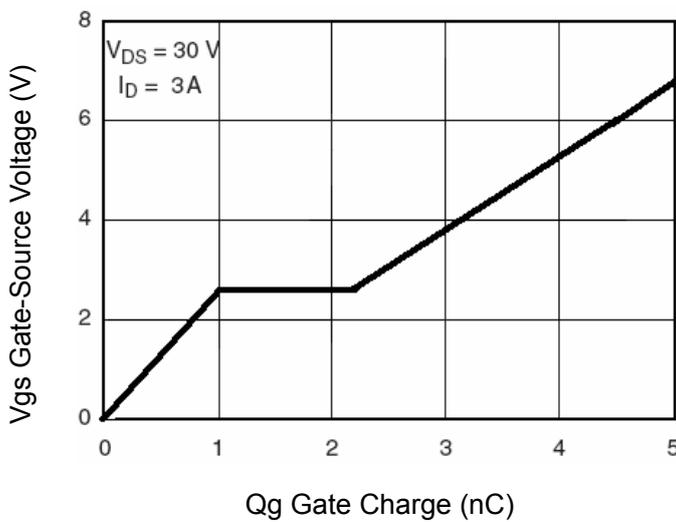**Figure 9 Rdson vs Vgs**

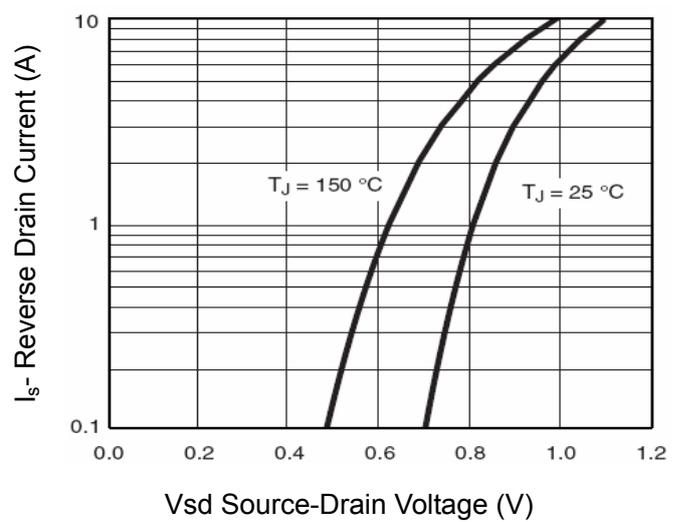**Figure 10 Capacitance vs Vds**

Figure 11 Gate Charge

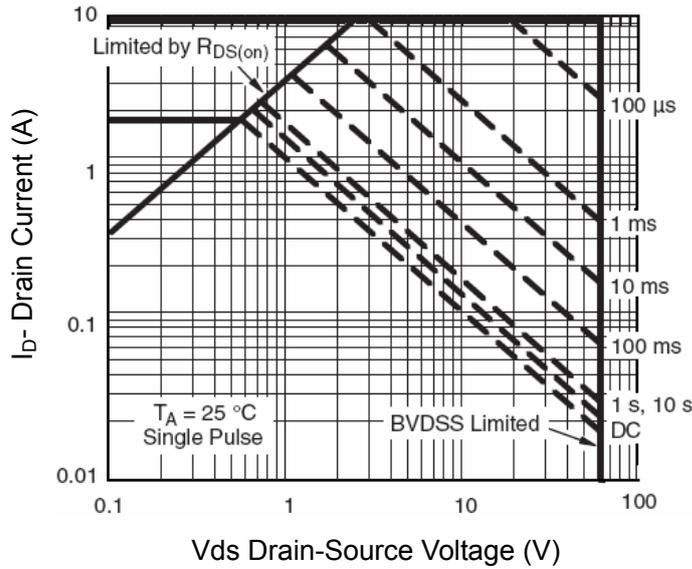**Figure 12 Source- Drain Diode Forward**

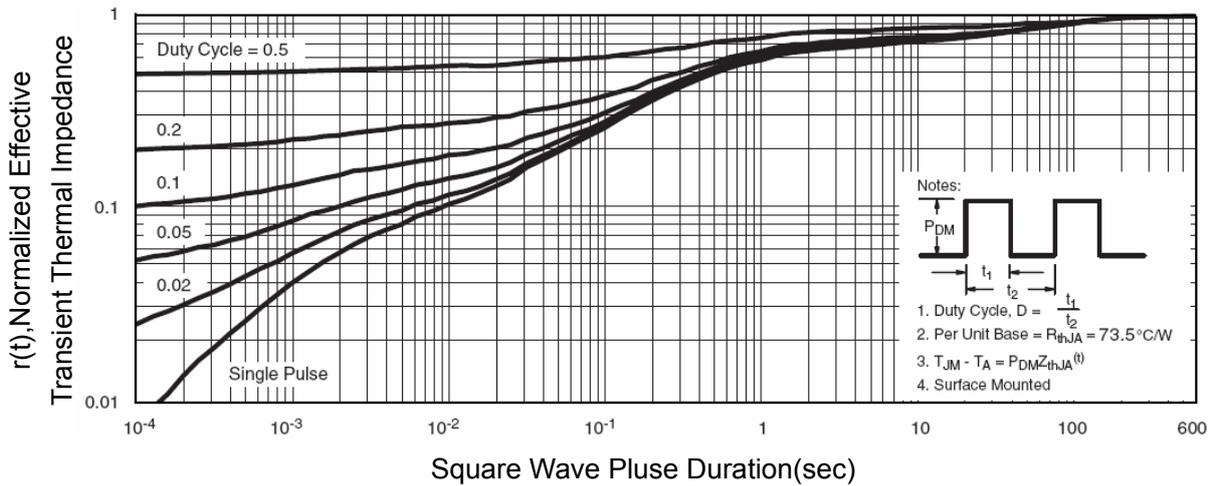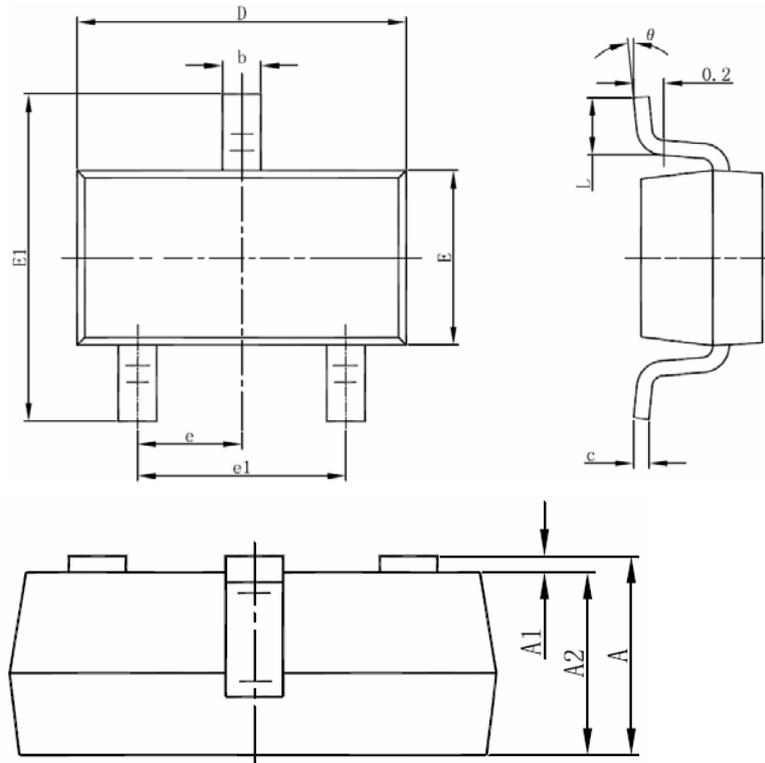**Figure 13 Safe Operation Area**

Figure 14 Normalized Maximum Transient Thermal Impedance

SOT-23-3L Package Information

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
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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