

NCE60P04R-VB Datasheet

P-Channel 60-V (D-S) MOSFET

PRODUCT SUMMARY			
V _{DS} (V)	R _{DS(on)} (Ω)	I _D (A) ^a	Q _g (Typ.)
- 60	0.055 at V _{GS} = - 10 V	- 7.0	30 nC
	0.065 at V _{GS} = - 4.5 V	- 6.0	

FEATURES

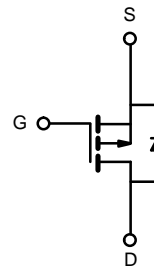
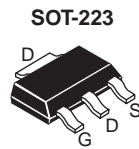
- TrenchFET[®] Power MOSFET
- 100 % UIS Tested

APPLICATIONS

- Load Switch



RoHS
COMPLIANT
HALOGEN
FREE



P-Channel MOSFET

ABSOLUTE MAXIMUM RATINGS (T _A = 25 °C, unless otherwise noted)				
Parameter	Symbol	Limit	Unit	
Drain-Source Voltage	V _{DS}	- 60	V	
Gate-Source Voltage	V _{GS}	± 20		
Continuous Drain Current (T _J = 150 °C)	I _D	T _C = 25 °C	- 7.0 ^a	A
		T _C = 70 °C	- 5.2	
		T _A = 25 °C	- 4.8 ^b	
		T _A = 70 °C	- 4.1 ^b	
Pulsed Drain Current	I _{DM}	- 25		
Avalanche Current Pulse	I _{AS}	- 4.5	L = 0.1 mH	
Single Pulse Avalanche Energy				
Continuous Source-Drain Diode Current	I _S	T _C = 25 °C	6.9 ^a	A
		T _A = 25 °C	3.5 ^b	
Maximum Power Dissipation	P _D	T _C = 25 °C	10.4 ^a	W
		T _C = 70 °C	6.6 ^a	
		T _A = 25 °C	2.1 ^b	
		T _A = 70 °C	1.1 ^b	
Operating Junction and Storage Temperature Range	T _J , T _{stg}	- 55 to 150	°C	

THERMAL RESISTANCE RATINGS					
Parameter	Symbol	Typical	Maximum	Unit	
Maximum Junction-to-Ambient ^b	Steady State	R _{thJA}	33	40	°C/W
			0.98	1.2	
Maximum Junction-to-Case	Steady State	R _{thJC}			

Notes:

a. Based on T_C = 25 °C.

b. Surface mounted on 1" x 1" FR4 board.

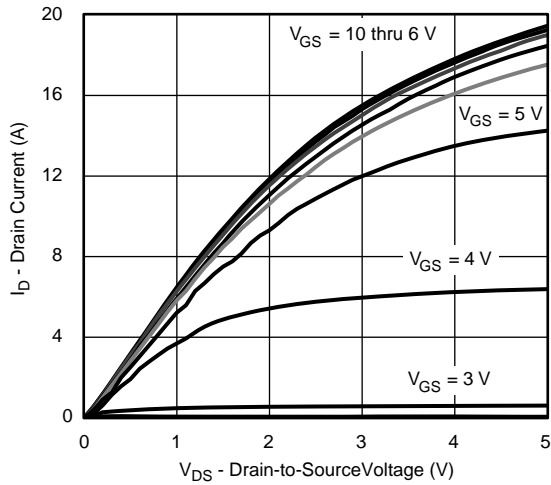
SPECIFICATIONS ($T_J = 25\text{ }^\circ\text{C}$, unless otherwise noted)						
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static						
Drain-Source Breakdown Voltage	V_{DS}	$V_{GS} = 0\text{ V}, I_D = -250\text{ }\mu\text{A}$	-60			V
V_{DS} Temperature Coefficient	$\Delta V_{DS}/T_J$	$I_D = -250\text{ }\mu\text{A}$		68		mV/°C
$V_{GS(th)}$ Temperature Coefficient	$\Delta V_{GS(th)}/T_J$			-5.2		
Gate-Source Threshold Voltage	$V_{GS(th)}$	$V_{DS} = V_{GS}, I_D = -250\text{ }\mu\text{A}$	-1.0		-2.5	V
Gate-Source Leakage	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 20\text{ V}$			± 100	nA
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}$			-1	μA
		$V_{DS} = -60\text{ V}, V_{GS} = 0\text{ V}, T_J = 55\text{ }^\circ\text{C}$			-10	
On-State Drain Current ^a	$I_{D(on)}$	$V_{DS} = -5\text{ V}, V_{GS} = -10\text{ V}$	-25			A
Drain-Source On-State Resistance ^a	$R_{DS(on)}$	$V_{GS} = -10\text{ V}, I_D = -3\text{ A}$		0.055		Ω
		$V_{GS} = -4.5\text{ V}, I_D = -2\text{ A}$		0.065		
Forward Transconductance ^a	g_{fs}	$V_{DS} = -15\text{ V}, I_D = -5\text{ A}$	20			S
Dynamic^b						
Input Capacitance	C_{iss}	$V_{DS} = -25\text{ V}, V_{GS} = 0\text{ V}, f = 1\text{ MHz}$		1500		pF
Output Capacitance	C_{oss}			200		
Reverse Transfer Capacitance	C_{rss}			150		
Total Gate Charge	Q_g	$V_{DS} = -30\text{ V}, V_{GS} = -10\text{ V}, I_D = -5\text{ A}$		38	56	nC
				19	30	
Gate-Source Charge	Q_{gs}	$V_{DS} = -30\text{ V}, V_{GS} = -4.5\text{ V}, I_D = -5\text{ A}$		9		
Gate-Drain Charge	Q_{gd}			10		
Gate Resistance	R_g	$f = 1\text{ MHz}$		5.2		Ω
Turn-On Delay Time	$t_{d(on)}$	$V_{DD} = -2\text{ V}, R_L = 2\text{ }\Omega$ $I_D = -5\text{ A}, V_{GEN} = -10\text{ V}, R_g = 1\text{ }\Omega$		10	15	ns
Rise Time	t_r			7	15	
Turn-Off Delay Time	$t_{d(off)}$			70	110	
Fall Time	t_f			40	60	
Drain-Source Body Diode Characteristics						
Continuous Source-Drain Diode Current	I_S	$T_C = 25\text{ }^\circ\text{C}$			-6.9	A
Pulse Diode Forward Current ^a	I_{SM}				-15	
Body Diode Voltage	V_{SD}	$I_S = -3\text{ A}$		-1	-1.5	V
Body Diode Reverse Recovery Time	t_{rr}	$I_F = -5\text{ A}, di/dt = 10\text{ A}/\mu\text{s}, T_J = 25\text{ }^\circ\text{C}$		45	68	ns
Body Diode Reverse Recovery Charge	Q_{rr}			59	120	nC
Reverse Recovery Fall Time	t_a			29		ns
Reverse Recovery Rise Time	t_b			16		

Notes:

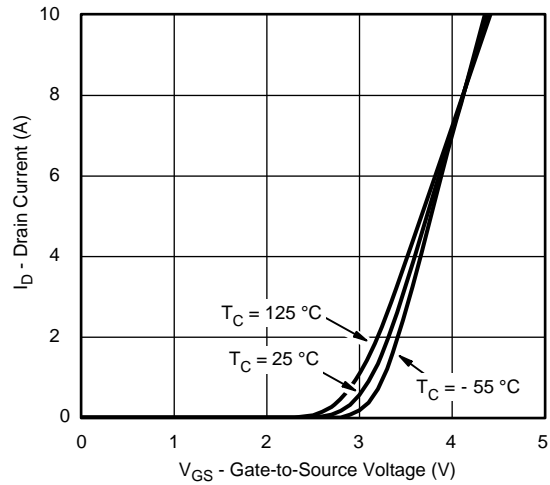
- a. Pulse test; pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
 b. Guaranteed by design, not subject to production testing.

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

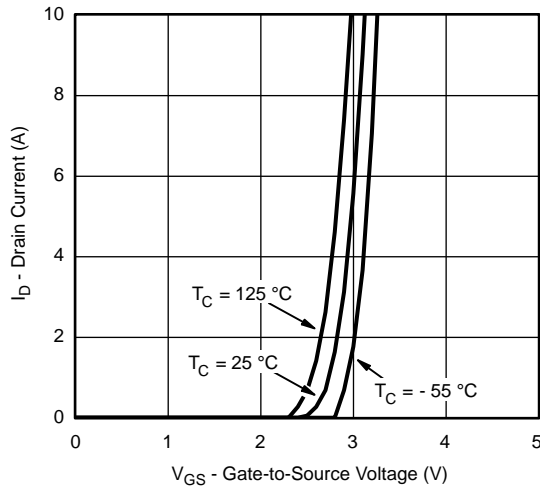
TYPICAL CHARACTERISTICS (25 °C, unless otherwise noted)



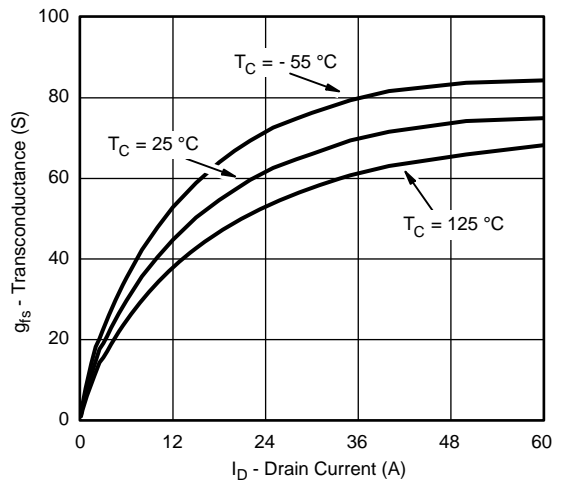
Output Characteristics



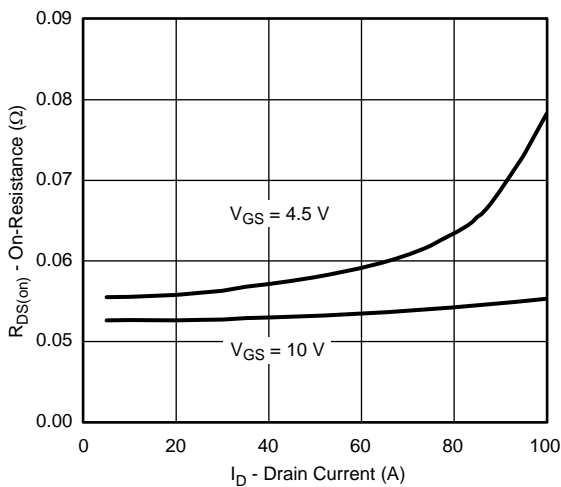
Transfer Characteristics



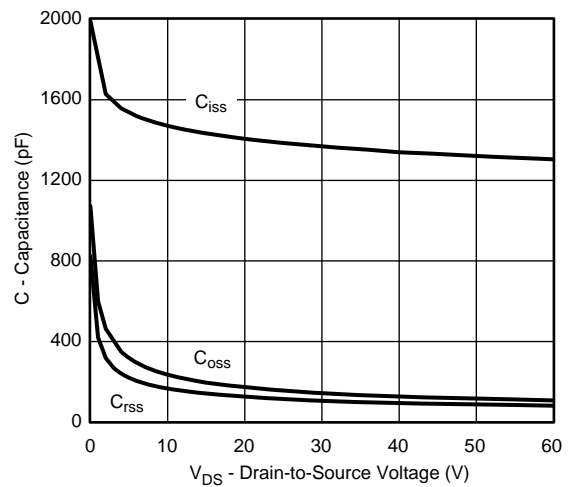
Transfer Characteristics



Transconductance

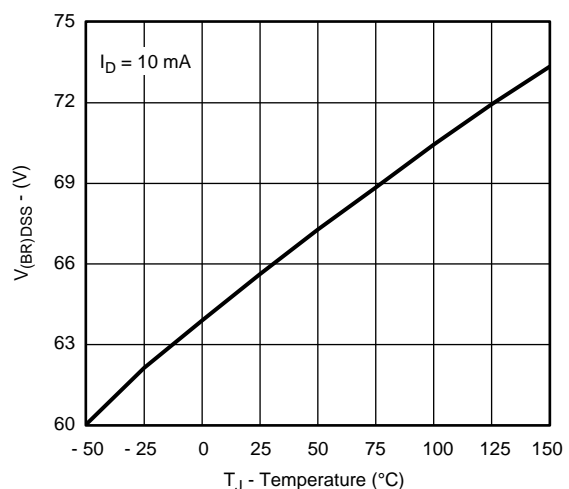
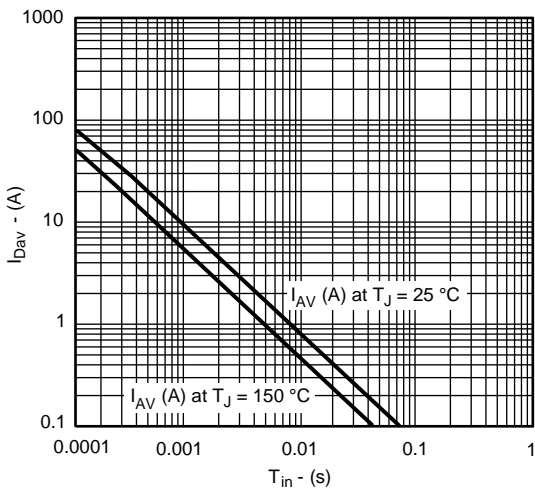
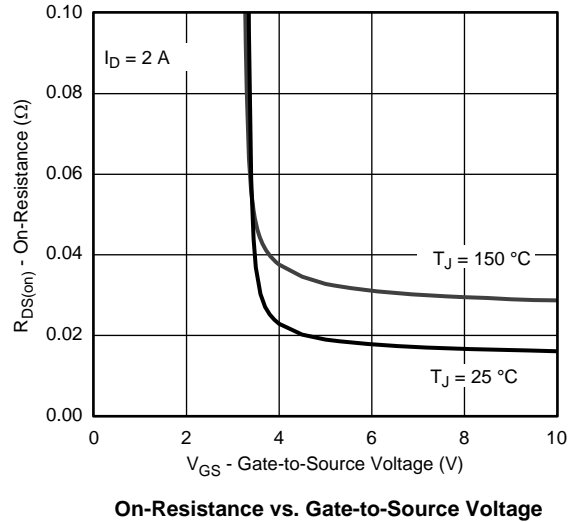
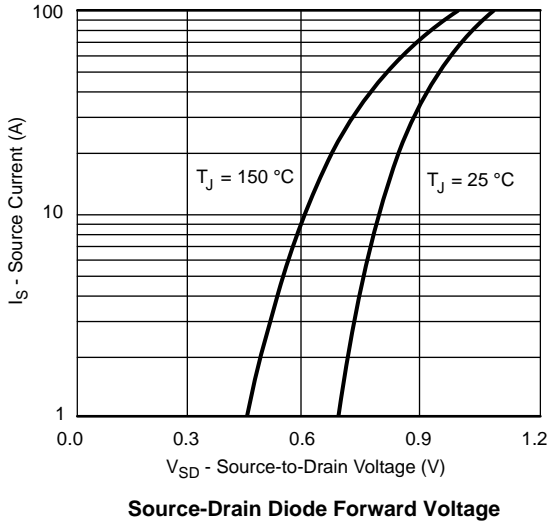
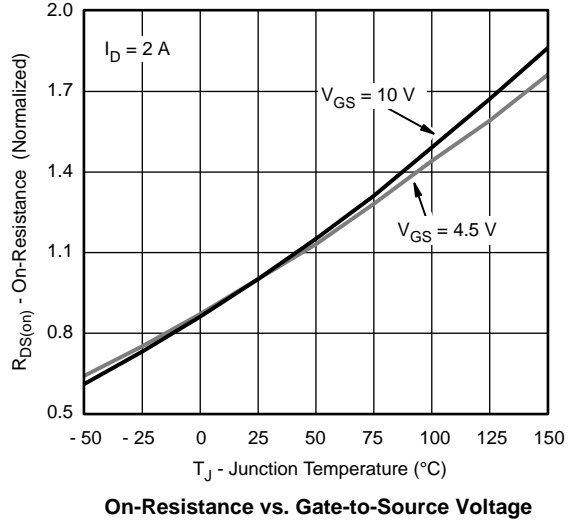
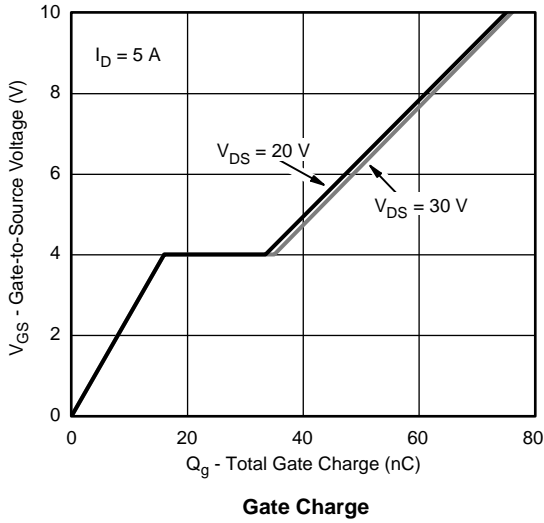


On-Resistance vs. Drain Current



Capacitance

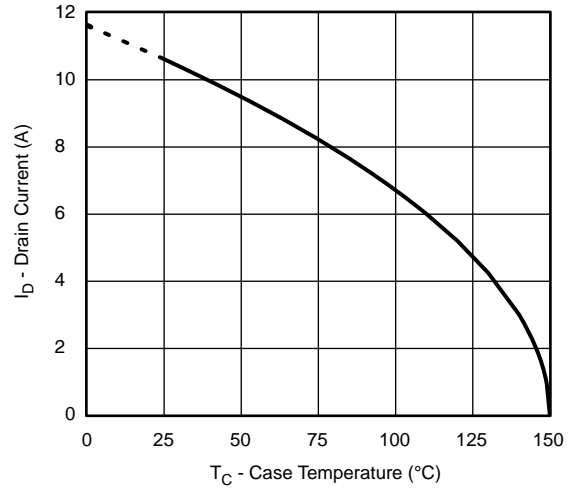
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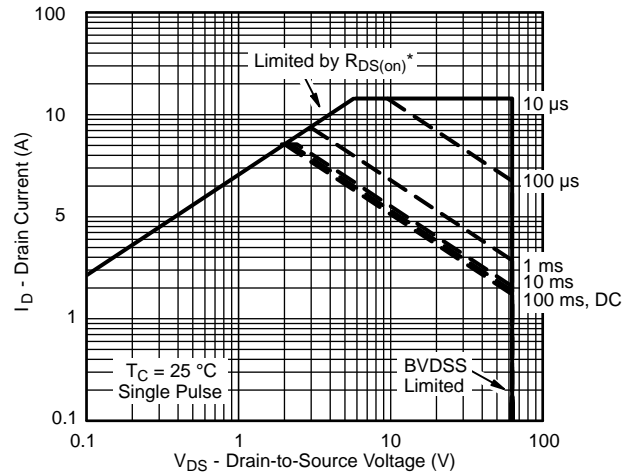
Threshold Voltage



Max. Drain Current vs. Case Temperature



Power Derating, Junction-to-Case

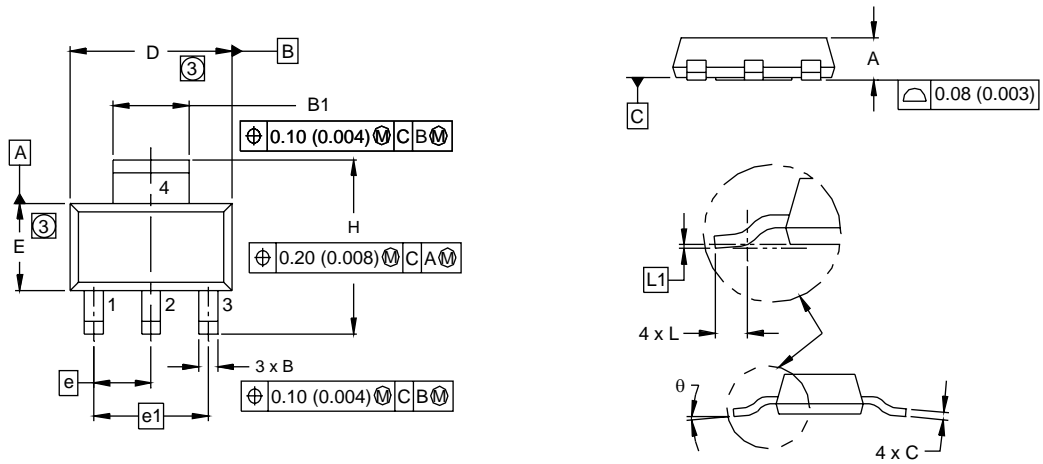


Safe Operating Area, Junction-to-Case



Normalized Thermal Transient Impedance, Junction-to-Case

SOT-223 (HIGH VOLTAGE)



DIM.	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.55	1.80	0.061	0.071
B	0.65	0.85	0.026	0.033
B1	2.95	3.15	0.116	0.124
C	0.25	0.35	0.010	0.014
D	6.30	6.70	0.248	0.264
E	3.30	3.70	0.130	0.146
e	2.30 BSC		0.0905 BSC	
e1	4.60 BSC		0.181 BSC	
H	6.71	7.29	0.264	0.287
L	0.91	-	0.036	-
L1	0.061 BSC		0.0024 BSC	
θ	-	10°	-	10°
ECN: S-82109-Rev. A, 15-Sep-08 DWG: 5969				

Notes

1. Dimensioning and tolerancing per ASME Y14.5M-1994.
2. Dimensions are shown in millimeters (inches).
3. Dimension do not include mold flash.
4. Outline conforms to JEDEC outline TO-261AA.

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