

NCE40P70K-ES

Rev-1.1

SuperMOS –TO-252 -40V BV_{DSS}, 6.7mΩ R_{DS(ON)}, P-channel MOSFET

1. Description

The NCE40P70K-ES is P-Channel enhancement MOS Field Effect Transistor. Uses advanced trench technology and design to provide excellent R_{DS(ON)} with low gate charge. Device is suitable for use in DC-DC conversion, power switch and charging circuit. Standard Product NCE40P70K-ES is Pb-free.

2. Features

- -40V, R_{DS(ON)}=6.7mΩ(Typ.) @V_{GS}=-10V
R_{DS(ON)}=8.5mΩ(Typ.) @V_{GS}=-4.5V
- Use trench MOSFET technology
- High density cell design for low R_{DS(on)}
- Material: Halogen free
- Reliable and rugged
- Avalanche Rated
- Low leakage current

3. Applications

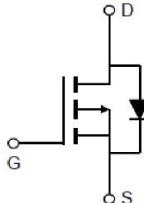
- PWM applications
- Load switch
- Power management in portable/desktop PCs
- DC/DC conversion

100% UIS TESTED

4. Ordering Information

Part Number	Package	Marking	Material	Packing	Quantity per reel	Flammability Rating	Reel Size
NCE40P70K-ES	TO-252	PQ04R08/LOT	Halogen free	Tape & Reel	2500 PCS	UL 94V-0	13 inches

5. Pin Configuration and Functions

Pin	Function	Outline	Circuit Diagram
1	Gate		
3	Source		
2	Drain		

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6. Specification

Absolute Maximum Rating & Thermal Characteristics

Ratings at 25 °C ambient temperature unless otherwise specified.

Parameter		Symbol	Limit	Unit
Drain-Source Voltage		BV_{DSS}	-40	V
Gate-Source Voltage		V_{GS}	±20	V
Continuous Drain Current	$T_C=25^{\circ}\text{C}$	I_D	-80	A
	$T_C=100^{\circ}\text{C}$		-50	
Maximum Power Dissipation		P_D	81.2	W
Pulsed Drain Current		I_{DM}	-320	A
Avalanche Current, Single Pulsed ^a		I_{AS}	-45	A
Avalanche Energy, Single Pulsed ^a		E_{AS}	101.25	mJ
Operating Junction Temperature		T_J	150	°C
Lead Temperature		T_L	260	°C
Storage Temperature Range		T_{stg}	-55 to 150	°C

Thermal resistance ratings

Single Operation				
Parameter	Symbol	Typical	Maximum	Unit
Junction-to-Case Thermal Resistance	$R_{\theta JC}$		1.54	°C/W

Note:

a: $T_J=25^{\circ}\text{C}$, $V_{DD}=-30\text{V}$, $V_G=-10\text{V}$, $L=0.1\text{mH}$, $R_g=25\Omega$

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Electrical Characteristics

At TA = 25°C unless otherwise specified

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	BV _{DSS}	V _{GS} =0V, I _D =-250uA	-40			V
Zero Gate Voltage Drain Current	I _{DSS}	V _{DS} =-40V, V _{GS} =0V			-1	uA
Gate-to-source Leakage Current	I _{GSS}	V _{DS} =0V, V _{GS} =±20V			±100	nA
ON CHARACTERISTICS						
Gate Threshold Voltage	V _{GS(TH)}	V _{GS} =V _{DS} , I _D =-250uA	-1.0	-1.6	-2.0	V
Drain-to-source On-resistance	R _{DS(on)}	V _{GS} =-10V, I _D =-20A		6.7	8.5	mΩ
		V _{GS} =-4.5V, I _D =-15A		8.5	11.5	
Forward transconductance	g _{fs}	V _{DS} =-5V, I _D =-10A		100		S
CHARGES, CAPACITANCES AND GATE RESISTANCE						
Input Capacitance	C _{ISS}	V _{GS} =0V, f=1MHz, V _{DS} =-20V		5300		pF
Output Capacitance	C _{OSS}			430		
Reverse Transfer Capacitance	C _{RSS}			385		
Total Gate Charge	Q _{G(TOT)}	V _{GS} =-10V, V _{DS} =-20V, I _D =-20A		110		nC
Gate-to-Source Charge	Q _{GS}			12.5		
Gate-to-Drain Charge	Q _{GD}			23		
SWITCHING CHARACTERISTICS						
Turn-On Delay Time	t _{d(ON)}	V _{GS} =-10V, V _{DS} =-20V, I _D =-20A, R _G =3Ω		16.6		ns
Rise Time	t _r			10		
Turn-Off Delay Time	t _{d(OFF)}			66		
Fall Time	t _f			17		
BODY DIODE CHARACTERISTICS						
Forward Voltage	V _{SD}	V _{GS} =0V, I _S =-20A			-1.5	V

7. Typical Characteristic

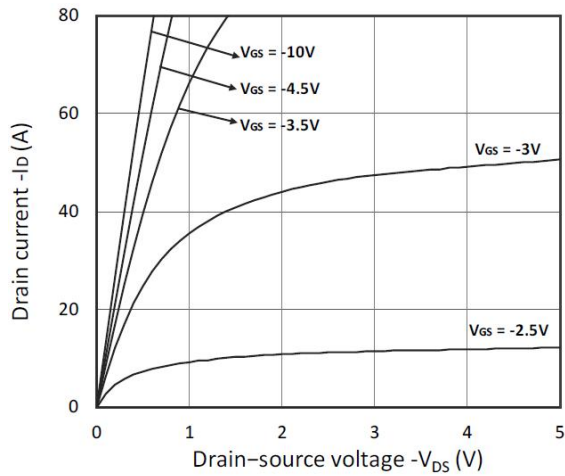


Figure 1. Output Characteristics

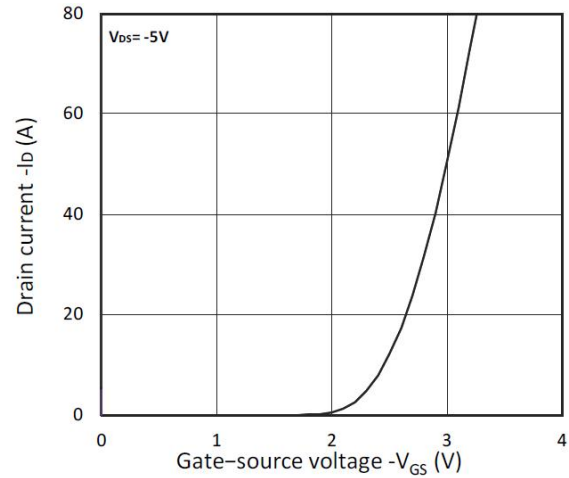


Figure 2. Transfer Characteristics

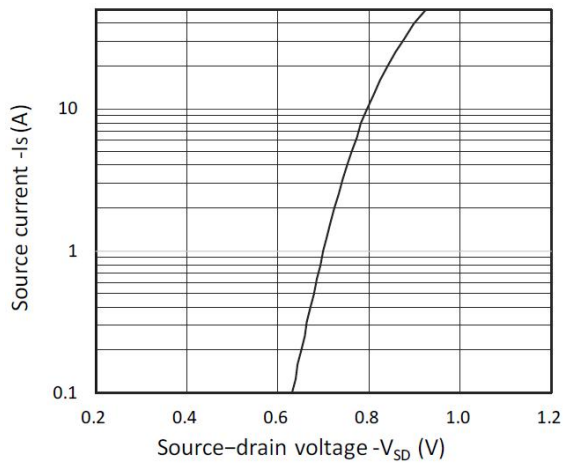
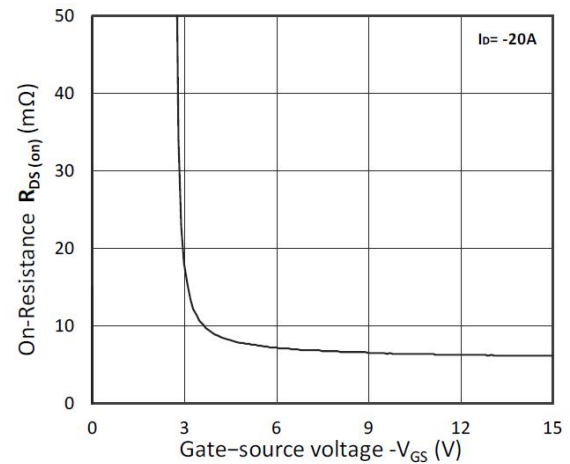
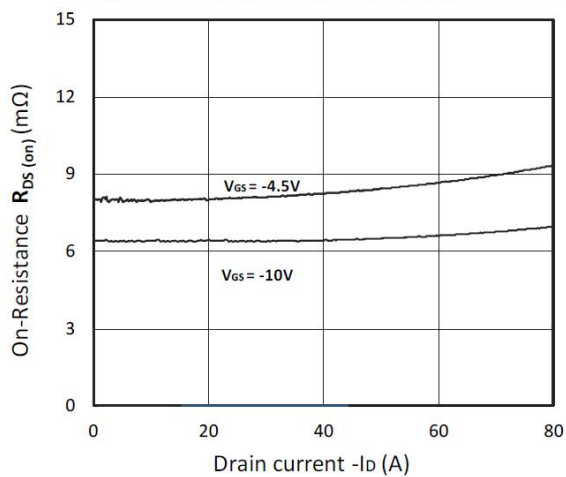
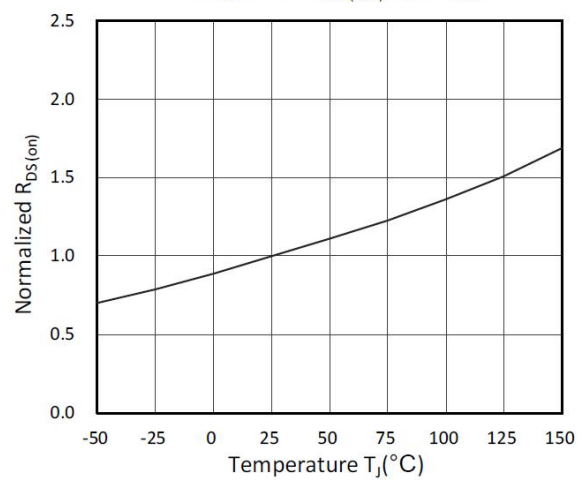


Figure 3. Forward Characteristics of Reverse

Figure 4. $R_{DS(on)}$ vs. V_{GS} Figure 5. $R_{DS(on)}$ vs. I_D Figure 6. Normalized $R_{DS(on)}$ vs. Temperature

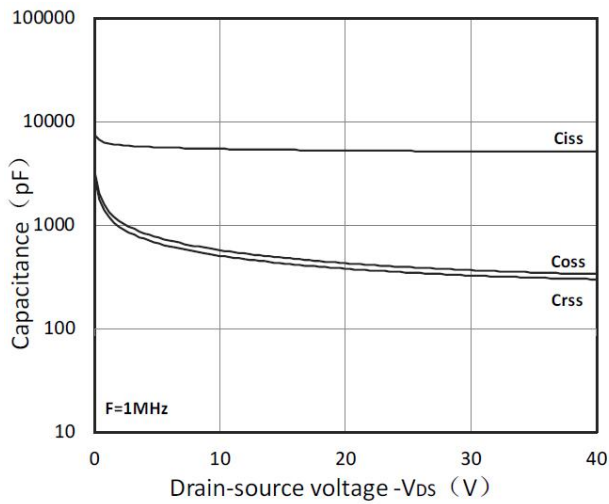


Figure 7. Capacitance Characteristics

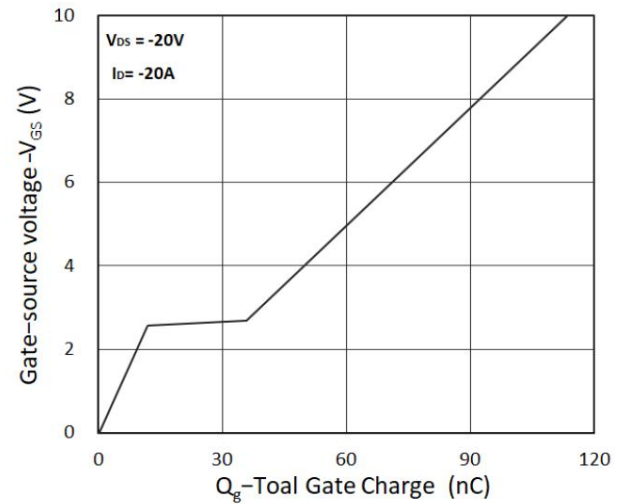


Figure 8. Gate Charge Characteristics

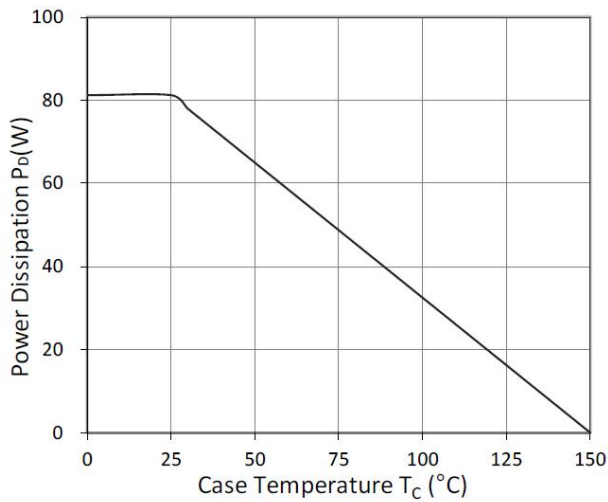


Figure 9. Power Dissipation

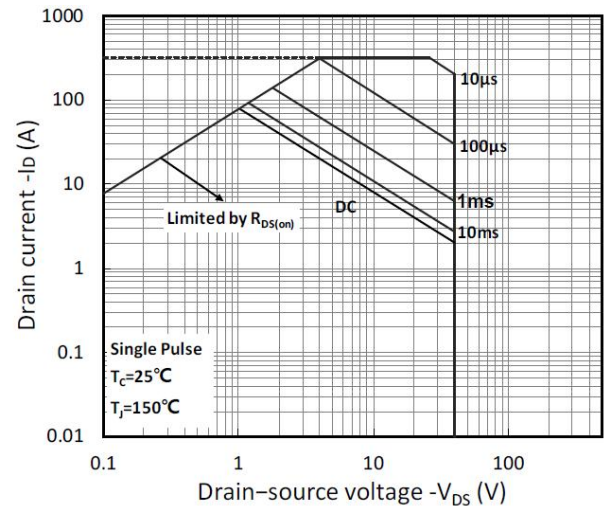


Figure 10. Safe Operating Area

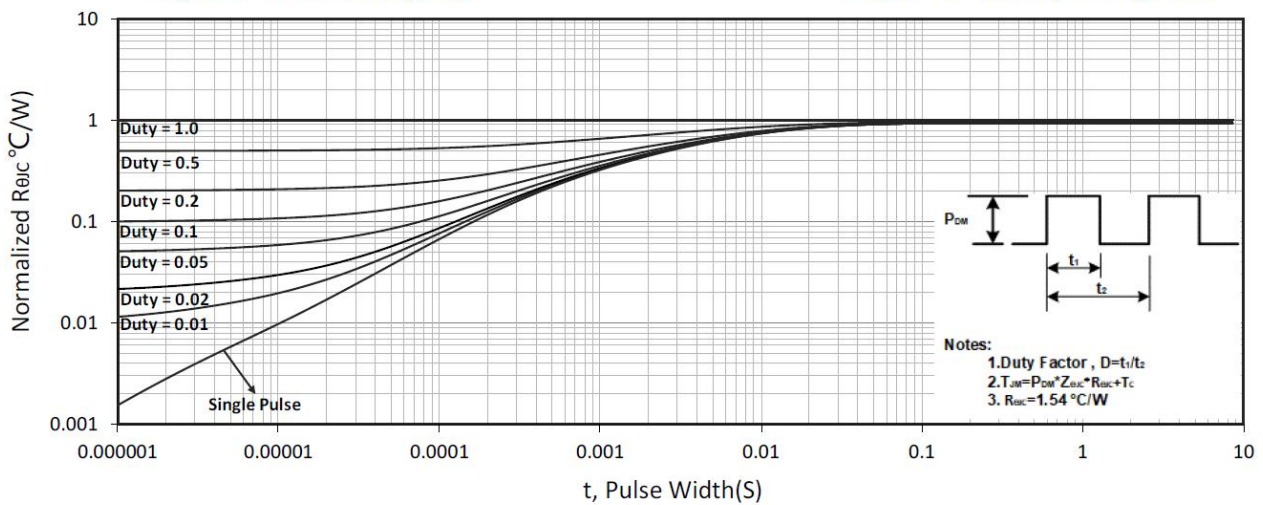
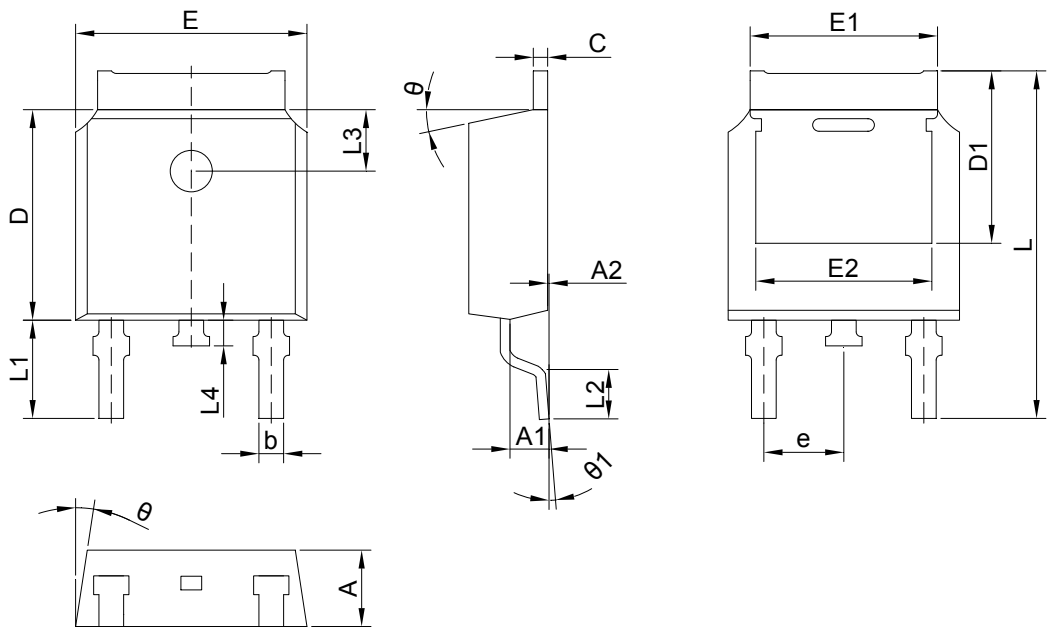


Figure 11. Normalized Maximum Transient Thermal Impedance

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8. Dimension (TO-252)



COMMON DIMENSIONS CUNITS MEASURE=MILLIMETER							
SYMBOL	MIN	TYP	MAX	SYMBOL	MIN	TYP	MAX
A	2.10	2.30	2.50	E2	4.63	4.83	5.03
A1	0.97	1.07	1.17	L	9.90	10.10	10.30
A2	0.00	-	0.12	L1	2.74	2.94	3.14
b	0.66	0.76	0.86	L2	1.40	1.50	1.70
C	0.45	0.51	0.60	L3	1.65	1.80	1.95
D	5.90	6.10	6.30	L4	0.60	0.80	1.00
D1	5.10	5.30	5.45	e	2.286 BSC		
E	6.40	6.60	6.80	theta	5°	7°	10°
E1	5.10	5.33	5.45	theta1	0°	-	3°

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