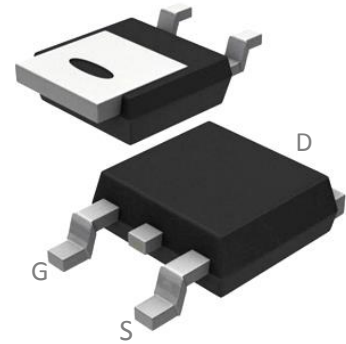


P-Channel Enhancement Mode MOSFET

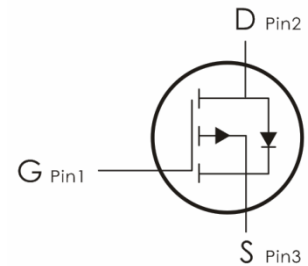
Description:

This P-Channel MOSFET uses advanced trench technology and design to provide excellent $R_{DS(on)}$ with low gate charge. It can be used in a wide variety of applications.



Features:

- 1) $V_{DS}=-60V, I_D=-50A, R_{DS(ON)}<29m\Omega @ V_{GS}=-10V$
- 2) Low gate charge.
- 3) Green device available.
- 4) Advanced high cell density trench technology for ultra $R_{DS(ON)}$.
- 5) Excellent package for good heat dissipation.



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

Symbol	Parameter	Ratings	Units
V_{DS}	Drain-Source Voltage	-60	V
V_{GS}	Gate-Source Voltage	± 20	V
I_D	Continuous Drain Current	-50	A
	Continuous Drain Current-TC=100 °C	-30	
I_{DM}	Pulsed Drain Current ¹	-144	
E_{AS}	Single Pulse Avalanche Energy ²	196	mJ
P_D	Power Dissipation	79	W
T_J, T_{STG}	Operating and Storage Junction Temperature Range	-55 to +175	°C

Thermal Characteristics:

Symbol	Parameter	Max	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.9	°C/W

Package Marking and Ordering Information:

Part NO.	Marking	Package
NCE60P50K	60P50K	TO-252

Electrical Characteristics: ($T_C=25^\circ\text{C}$ unless otherwise noted)

Symbol	Parameter	Conditions	Min	Typ	Max	Units
Off Characteristics						
BV_{DSS}	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\ \mu\text{A}$	-60	---	---	V
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS}=0V, V_{DS}=-60V$	---	---	-1	μA
I_{GSS}	Gate-Source Leakage Current	$V_{GS}=\pm 20V, V_{DS}=0A$	---	---	± 100	nA
On Characteristics						
$V_{GS(th)}$	GATE-Source Threshold Voltage	$V_{GS}=V_{DS}, I_D=250\ \mu\text{A}$	-1	-1.8	-2.5	V
$R_{DS(on)}$	Drain-Source On Resistance ^②	$V_{GS}=-10V, I_D=-15A$	---	24	29	m Ω
		$V_{GS}=-4.5V, I_D=-10A$	---	30.4	39	
G_{FS}	Forward Transconductance	$V_{DS}=-5V, I_D=-15A$	---	35	---	S
Dynamic Characteristics						
C_{iss}	Input Capacitance	$V_{DS}=-25V, V_{GS}=0V, f=1\text{MHz}$	---	4025	---	pF
C_{oss}	Output Capacitance		---	133	---	
C_{rss}	Reverse Transfer Capacitance		---	97	---	
Switching Characteristics						
$t_{d(on)}$	Turn-On Delay Time	$V_{DD}=-30V$ $R_{GEN}=3\ \Omega, V_{GS}=-10V$	---	12	---	ns
t_r	Rise Time		---	9	---	ns
$t_{d(off)}$	Turn-Off Delay Time		---	63	---	ns
t_f	Fall Time		---	13	---	ns
Q_g	Total Gate Charge	$V_{GS}=-10V, V_{DS}=-30V,$ $I_D=-20A$	---	53	---	nC
Q_{gs}	Gate-Source Charge		---	10	---	nC
Q_{gd}	Gate-Drain "Miller" Charge		---	12	---	nC
Drain-Source Diode Characteristics						
V_{SD}	Source-Drain Diode Forward Voltage ³	$V_{GS}=0V, I_S=-15A, T_J=25^\circ\text{C}$	---	-0.88	-1.2	V
I_S	Continuous Drain Current	$V_D=V_G=0V$	---	-30	---	V
I_{SM}	Pulsed Drain Current	$V_D=V_G=0V$	---	-144	---	V

t_{rr}	Reverse Recovery Time	$I_{sd}=-20A, V_{GS}=0V$	---	26	---	ns
Q_{rr}	Reverse Recovery Charge		$.dI/dt=-500A/\mu s$	---	29	---

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
2. E_{AS} condition: $T_J=25^\circ C, V_{DD}=40V, V_G=-10V, R_g=25\Omega, L=0.5mH$.
- 3.Repetitive Rating: Pulse width limited by maximum junction temperature.

Typical Characteristics: ($T_c=25^\circ C$ unless otherwise noted)

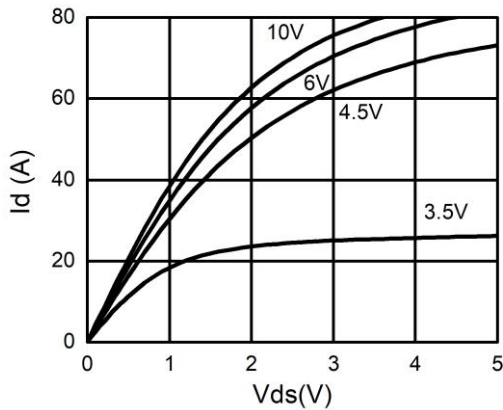


Figure 1. Output Characteristics

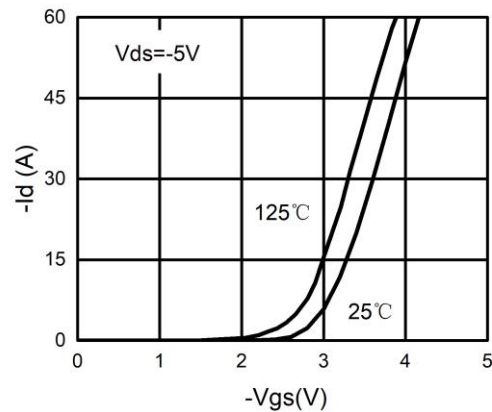


Figure 2. Transfer Characteristics

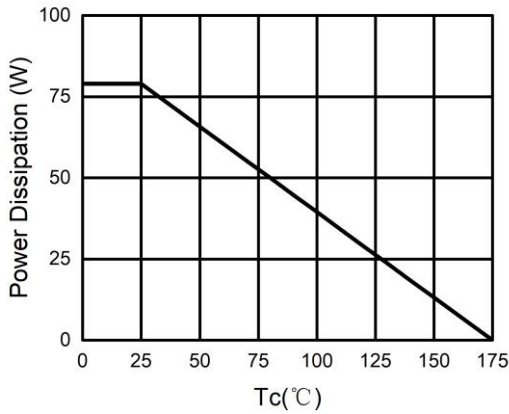


Figure 3. Power Dissipation

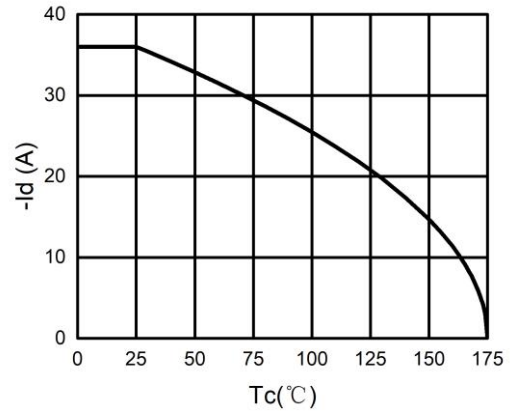


Figure 4. Drain Current

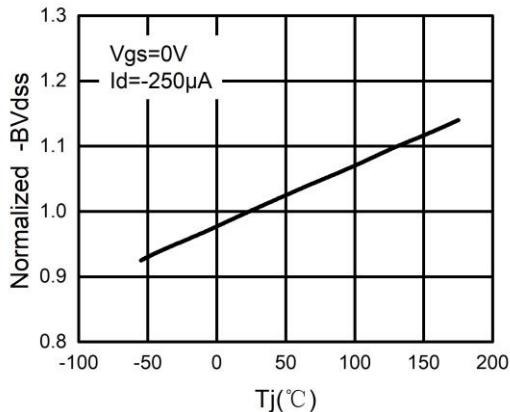


Figure 5. BV_{DSS} vs Junction Temperature

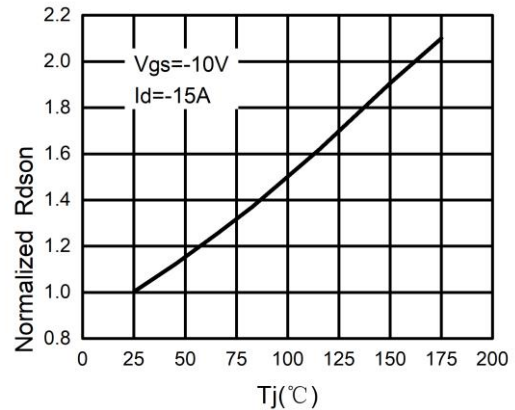


Figure 6. $R_{DS(ON)}$ vs Junction Temperature

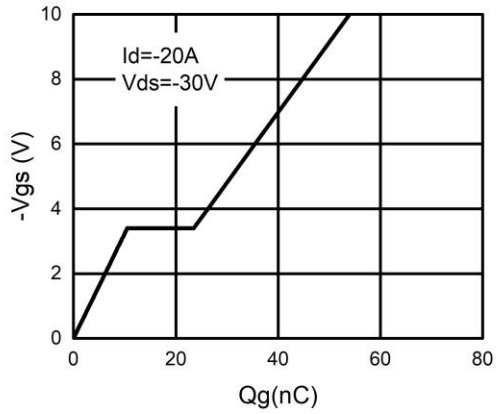


Figure 7. Gate Charge Waveforms

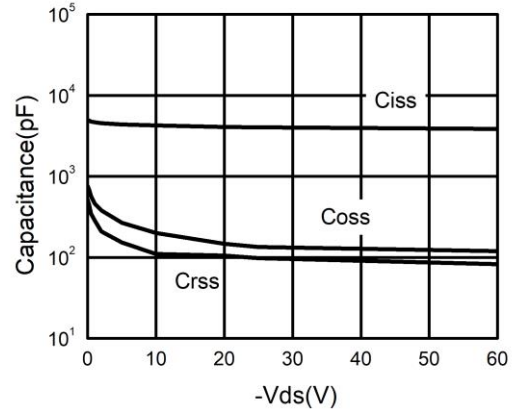


Figure 8. Capacitance

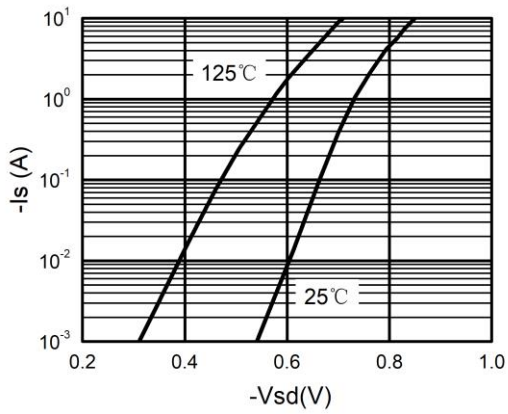


Figure 9. Body-Diode Characteristics

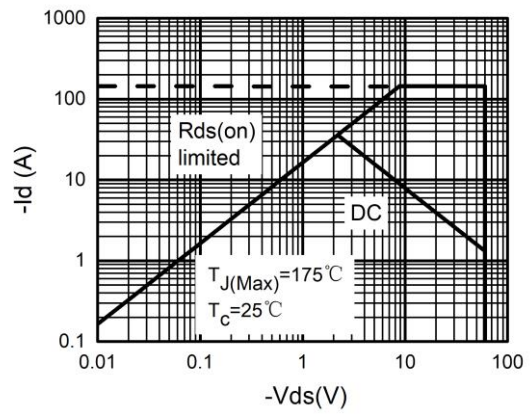


Figure 10. Maximum Safe Operating Area

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