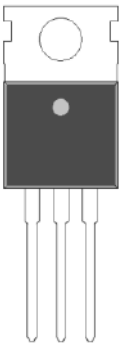
N-Channel Enhancement Mode Power MOSFET

Features:

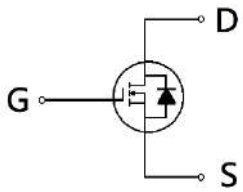
- Low On Resistance
- Low Gate Charge
- Fast Switching Characteristic

TO-220



G D S

BV_{DSS}	40V
I_D@V_{GS}=10V, T_C=25°C (silicon limit)	240A
I_D@V_{GS}=10V, T_C=25°C (package limit)	195A
I_D@V_{GS}=10V, T_A=25°C	25A
$R_{DS(ON)}$ typ. @V_{GS}=10V, I_D=50A	1.4mΩ



G : Gate S : Source D : Drain

Ordering Information

Device	Package	Shipping
KE1D3N04B	TO-220 (Pb-free lead plating package)	50 pcs/tube, 20 tubes/box, 5 boxes / carton

Absolute Maximum Ratings (T_A=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±20	
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (silicon limit)	*a	I_D	240	A
Continuous Drain Current @ V_{GS}=10V, T_C=25°C (package limit)	*a		195	
Continuous Drain Current @ V_{GS}=10V, T_C=100°C	*a		170	
Continuous Drain Current @ V_{GS}=10V, T_A=25°C	*b		25	
Continuous Drain Current @ V_{GS}=10V, T_A=70°C	*b		20	
Pulsed Drain Current	*c	I_{DM}	780	
Continuous Body Diode Forward Current @ T_C=25°C	*a	I_S	208	
Avalanche Current @ L=0.1mH		I_{AS}	100	
Avalanche Energy @ L=0.5mH		E_{AS}	625	mJ
Total Power Dissipation	T_C=25°C *a	P_D	250	W
	T_C=100°C *a		125	
	T_A=25°C *b		2.6	
	T_A=70°C *b		1.8	
Operating Junction and Storage Temperature Range		T_J, T_{stg}	-55~+175	°C

Thermal Data

Parameter		Symbol	Steady State	Unit
Thermal Resistance, Junction-to-case		$R_{\theta JC}$	0.6	°C/W
Thermal Resistance, Junction-to-ambient	*b	$R_{\theta JA}$	58	

Note:

*a. The power dissipation P_D is based on $T_{J(MAX)}$=175℃, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

*b. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in^2 FR -4 board with 2 oz. copper, in a still air environment with T_A=25℃. The power dissipation P_D is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 175℃. The value in any given application depends on the user's specific board design.

*c. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=175℃. Ratings are based on low frequency and low duty cycles to keep initial T_J=25℃.

Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	2	-	4		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	35.8	-	S	V_{DS}=10V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±20V, V_{DS}=0V
I_{DSS}	-	-	1	μA	V_{DS}=32V, V_{GS}=0V
$R_{DS(ON)}$	-	1.4	2	mΩ	V_{GS}=10V, I_D=50A
Dynamic					
Ciss	-	8750	-	pF	V_{DS}=20V, V_{GS}=0V, f=1MHz
Coss	-	1100	-		
Crss	-	660	-		
Rg	-	2.5	-	Ω	f=1MHz
Qg *1, 2	-	175	-	nC	V_{DS}=20V, I_D=50A, V_{GS}=10V
Qgs *1, 2	-	39	-		
Qgd *1, 2	-	54	-		
$t_{d(ON)}$ *1, 2	-	40	-	ns	V_{DS}=20V, I_D=50A, V_{GS}=10V, R_{GS}=1Ω
tr *1, 2	-	22	-		
$t_{d(OFF)}$ *1, 2	-	115	-		
t_f *1, 2	-	35	-		
Source-Drain Diode					
V_{SD} *1	-	0.79	1.2	V	I_S=30A, V_{GS}=0V
trr	-	33	-	ns	I_F=30A, dI_F/dt=100A/μs
Qrr	-	30	-	nC	

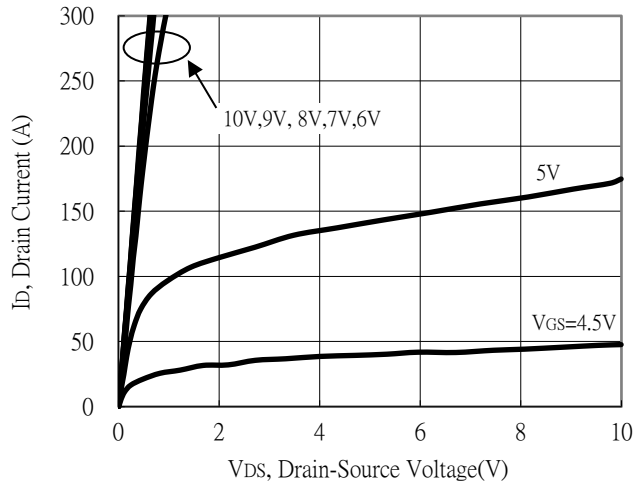
Note:

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

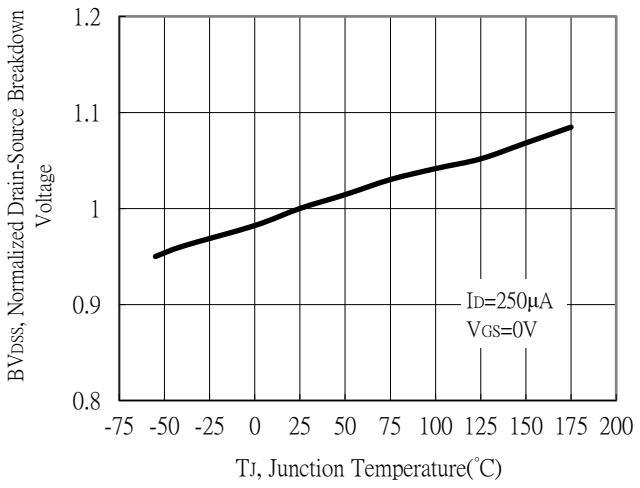
*2. Independent of operating temperature

Typical Characteristics

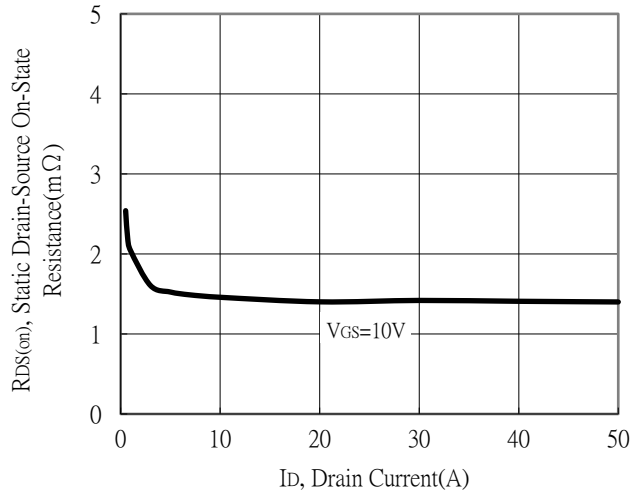
Typical Output Characteristics



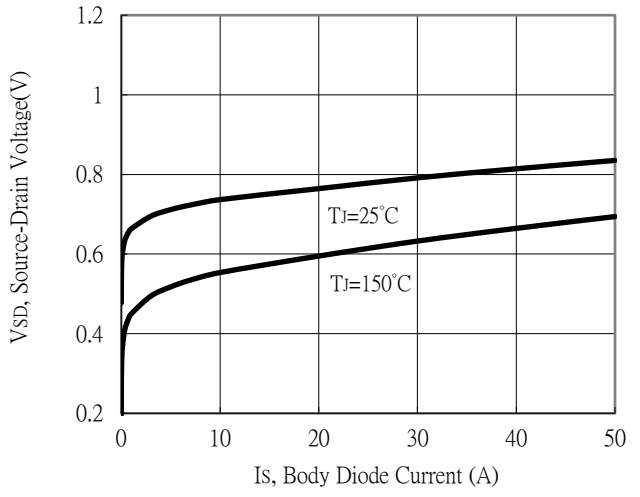
Breakdown Voltage vs Ambient Temperature



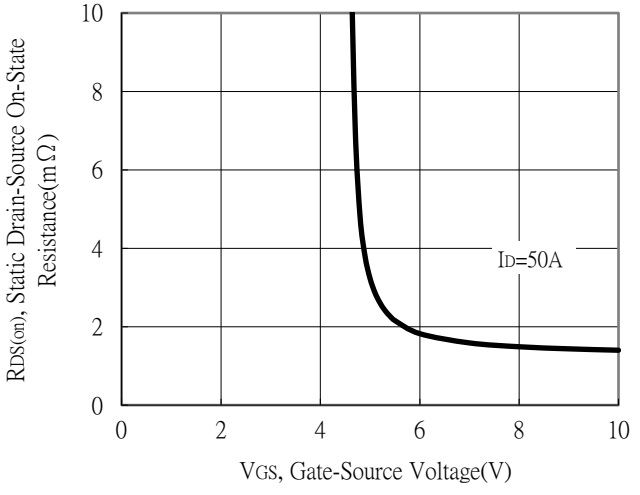
Static Drain-Source On-State resistance vs Drain Current



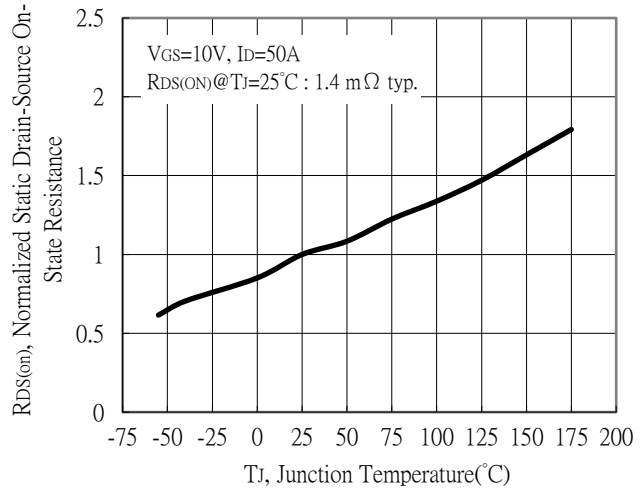
Body Diode Current vs Source-Drain Voltage



Static Drain-Source On-State Resistance vs Gate-Source Voltage

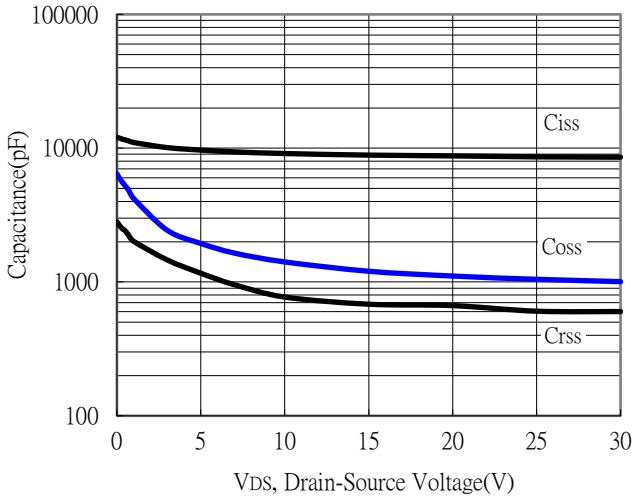


Drain-Source On-State Resistance vs Junction Temperature

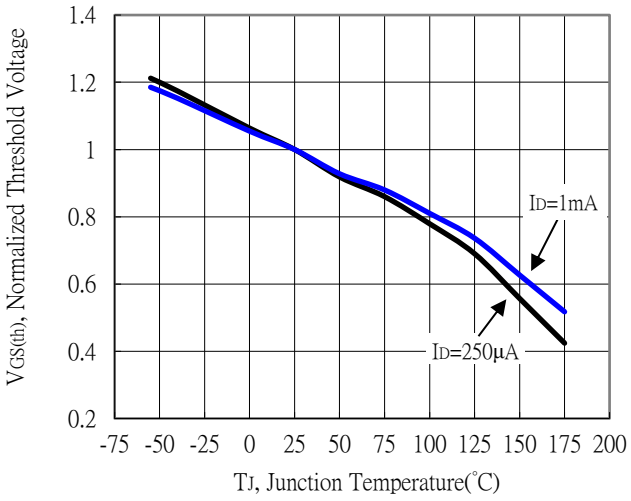


Typical Characteristics (Cont.)

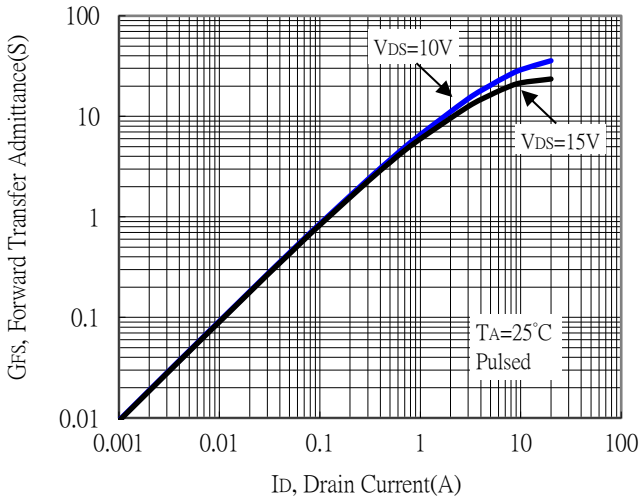
Capacitance vs Drain-to-Source Voltage



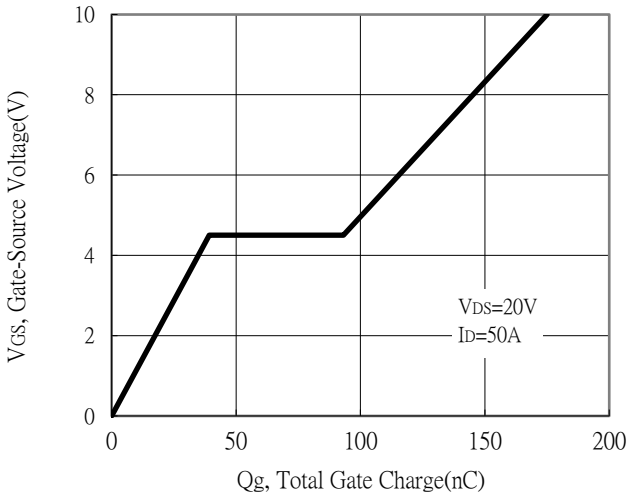
Threshold Voltage vs Junction Temperature



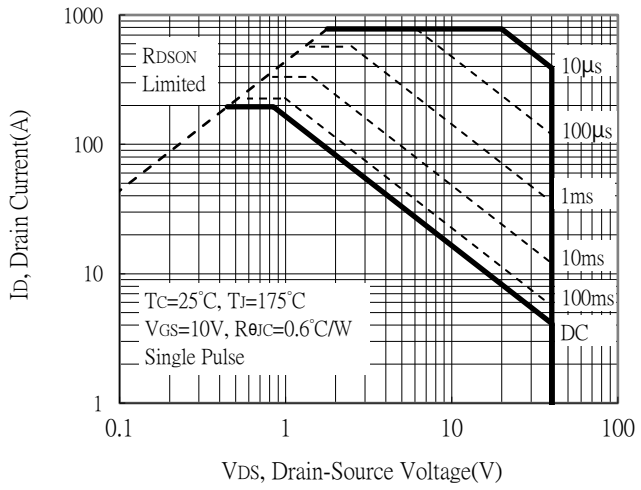
Forward Transfer Admittance vs Drain Current



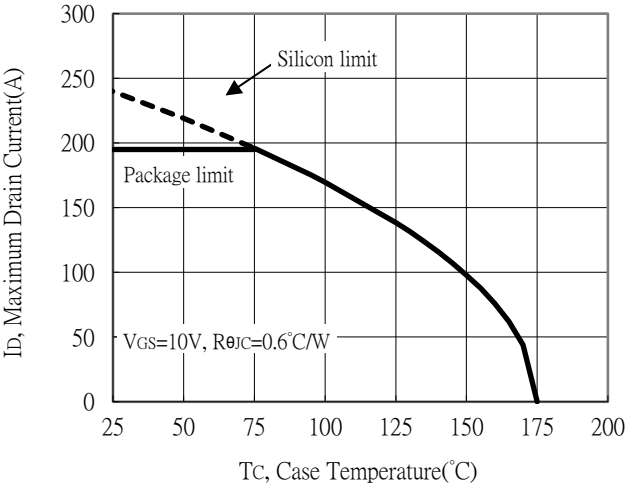
Gate Charge Characteristics



Maximum Safe Operating Area

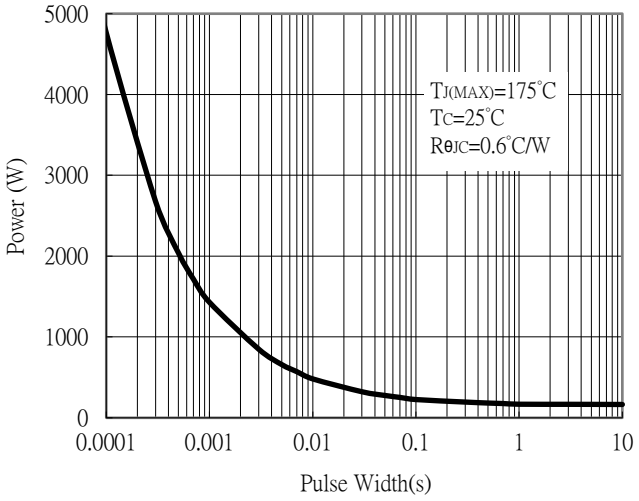


Maximum Drain Current vs Case Temperature

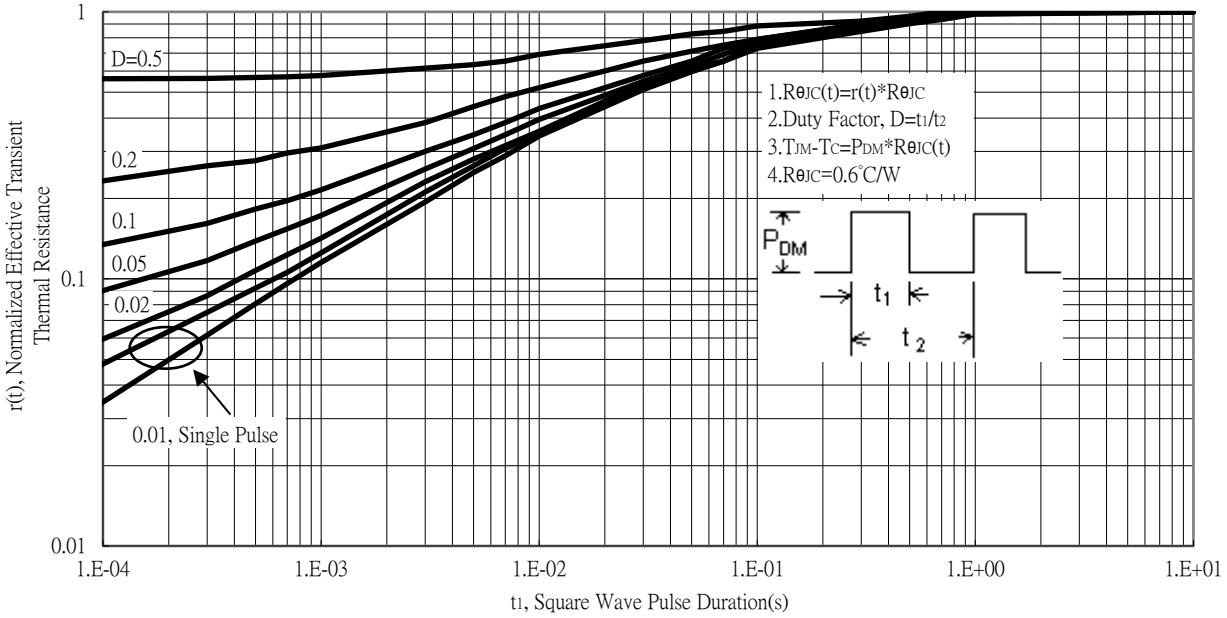


Typical Characteristics (Cont.)

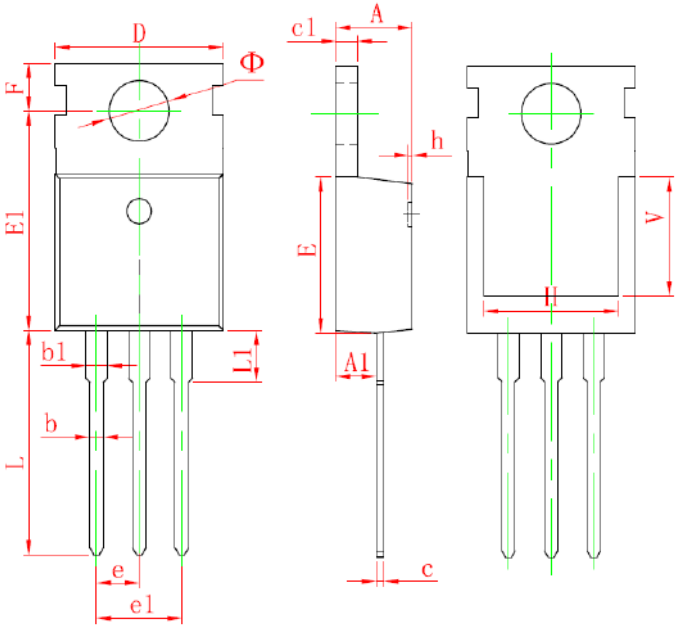
Single Pulse Power Rating, Junction to Case



Transient Thermal Response Curves

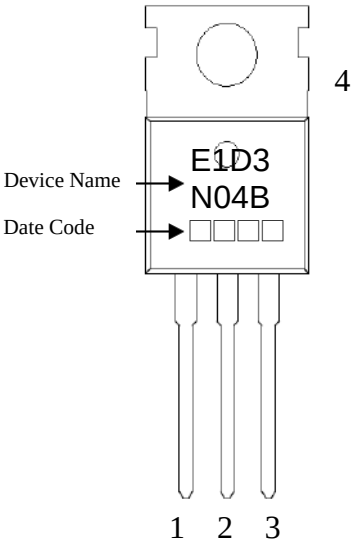


TO-220 Dimension



3-Lead TO-220 Plastic Package

Marking:



Style: Pin 1.Gate 2.Drain 3.Source
4.Drain

*: Typical

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	4.400	4.600	0.173	0.181	e	2.540*		0.100*	
A1	2.250	2.550	0.089	0.100	e1	4.980	5.180	0.196	0.204
b	0.710	0.910	0.028	0.036	F	2.650	2.950	0.104	0.116
b1	1.170	1.370	0.046	0.054	H	7.900	8.100	0.311	0.319
c	0.330	0.650	0.013	0.026	h	0.000	0.300	0.000	0.012
c1	1.200	1.400	0.047	0.055	L	12.900	13.400	0.508	0.528
D	9.910	10.250	0.390	0.404	L1	2.850	3.250	0.112	0.128
E	8.950	9.750	0.352	0.384	V	6.900	REF	0.271	REF
E1	12.650	13.050	0.498	0.514	Φ	3.600	3.800	0.142	0.150