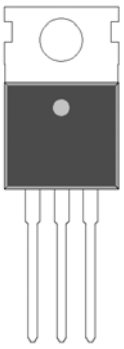
KWE2D0N04E3

N-Channel Enhancement Mode Power MOSFET

Features:

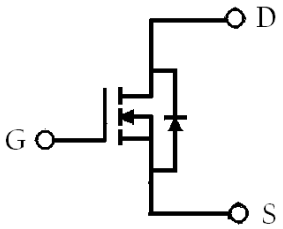
- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- RoHS compliant package

TO-220



G D S

BV_{DSS}	**40V**
I_D@V_{GS}=10V, T_C=25˚C	**84A**
I_D@V_{GS}=10V, T_A=25˚C	**17.3A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=20A	**2.0 mΩ (typ)**



G：Gate D：Drain S：Source

Ordering Information

Device	Package	Shipping
KWE2D0N04E3	TO-220 (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton

Absolute Maximum Ratings (T_C=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage (Note 1)		V_{DS}	40	V
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current @T_C=25°C, V_{GS}=10V (silicon limit) (Note 5)		I_D	165	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V(silicon limit) (Note 5)			117	
Continuous Drain Current @T_C=25°C, V_{GS}=10V (package limit) (Note 1)			84	
Continuous Drain Current @T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	17.3	
Continuous Drain Current @T_A=70°C, V_{GS}=10V (Note 2)			13.8	
Pulsed Drain Current		I_{DM}	584	
Single Pulse Avalanche Current		I_{AS}	50	
Single Pulse Avalanche Energy @ L=1mH, I_D=50 Amps, V_{DD}=30V (Note 4)		E_{AS}	1250	mJ
Repetitive Avalanche Energy (Note 3)		E_{AR}	16	
Power Dissipation	T_C=25°C (Note 1)	P_D	166	W
	T_C=100°C (Note 1)		83	
	T_A=25°C (Note 2)	P_{DSM}	2.1	
	T_A=70°C (Note 2)		1.3	
Maximum Temperature for Soldering @ Lead at 0.063 in(1.6mm) from case for 10 seconds		T_L	300	°C
Maximum Temperature for Soldering @ Package Body for 10 seconds		T_{PKG}	260	
Operating Junction and Storage Temperature		Tj, Tstg	-55~+175	

*Drain current limited by maximum junction temperature

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	$R_{\theta JC}$	0.9	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	60	

Note : 1.The power dissipation P_D is based on $T_{J(MAX)}$=175°C, using junction-to-case thermal resistance, and is more useful in setting the upper dissipation limit for cases where additional heatsinking is used.

2. The value of $R_{\theta JA}$ is measured with the device mounted on 1 in² FR-4 board with 2 oz. copper, in a still air environment with T_A=25°C. The power dissipation P_{DSM} is based on $R_{\theta JA}$ and the maximum allowed junction temperature of 150°C. The value in any given application depends on the user's specific board design, and the maximum temperature of 175°C may be used if the PCB allows it.

3. Pulse width limited by junction temperature $T_{J(MAX)}$=175°C.

4. Ratings are based on low frequency and low duty cycles to keep initial T_J=25°C. 100% tested by conditions of V_{DD}=30V, I_D=20A, L=1mH, V_{GS}=10V.

5. Calculated continuous drain current based on maximum allowable junction temperature.

6. The static characteristics are obtained using <300μs pulses, duty cycle 0.5% maximum.

7. The $R_{\theta JA}$ is the sum of thermal resistance from junction to case $R_{\theta JC}$ and case to ambient.

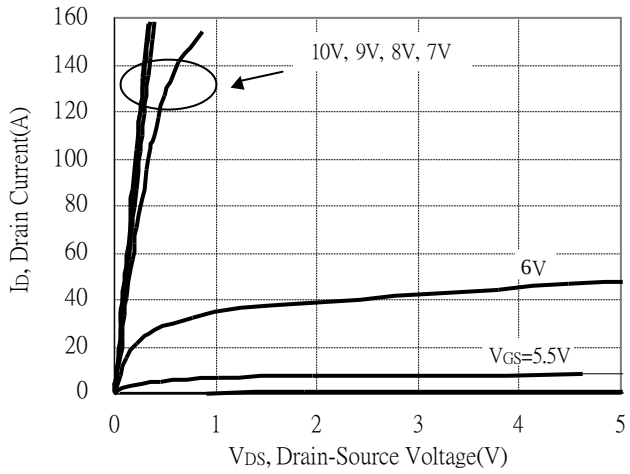
Characteristics (Tj=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	40	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	32	-	mV/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2	-	4	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	31.5	-	S	V_{DS} =10V, I_D=20A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	1	μA	V_{DS} =40V, V_{GS} =0V
	-	-	5		V_{DS} =32V, V_{GS} =0V, Tj=55°C
*$R_{DS(ON)}$	-	2.0	2.6	mΩ	V_{GS} =10V, I_D=20A
Dynamic					
*Qg	-	114	-	nC	V_{DS}=20V, V_{GS}=10V, I_D=84A
*Qgs	-	33	-		
*Qgd	-	37	-		
*$t_{d(ON)}$	-	41.8	-	ns	V_{DS}=20V, I_D=20A, V_{GS}=10V, R_{GS}=2.7Ω
*tr	-	30.4	-		
*$t_{d(OFF)}$	-	71.8	-		
*t_f	-	24	-		
Ciss	-	5867	-	pF	V_{GS}=0V, V_{DS}=25V, f=1MHz
Coss	-	862	-		
Crss	-	398	-		
Rg	-	0.6	-	Ω	f=1MHz
Source-Drain Diode					
*I_S	-	-	84	A	
*I_{SM}	-	-	584		
*V_{SD}	-	0.69	1	V	I_S=1A, V_{GS}=0V
*trr	-	18	-	ns	V_{GS}=0V, I_F=20A, dI_F/dt=100A/μs
*Qrr	-	36	-	nC	

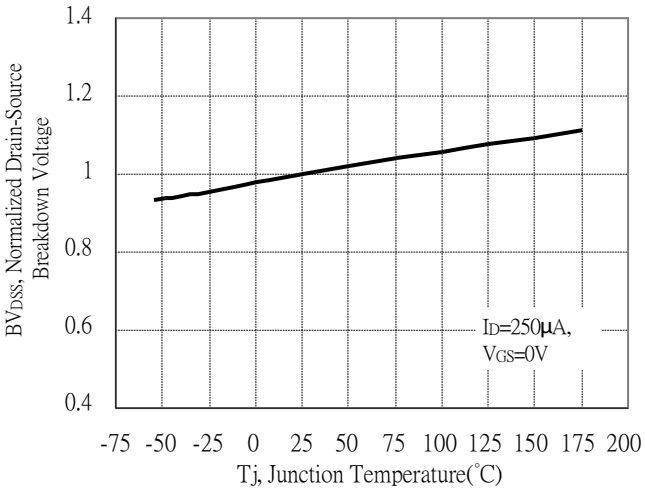
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Typical Characteristics

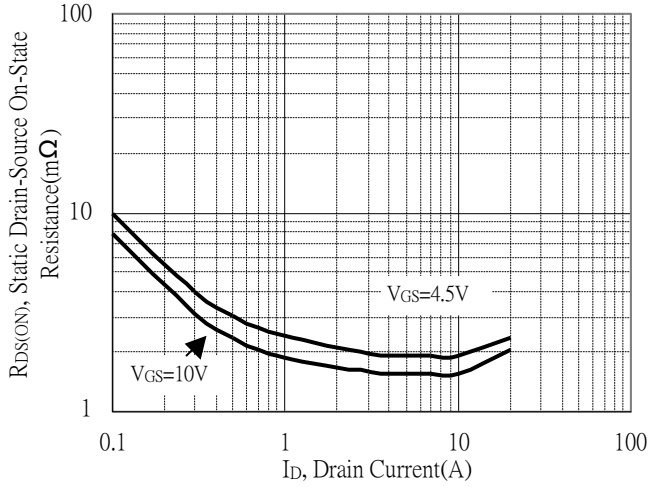
Typical Output Characteristics



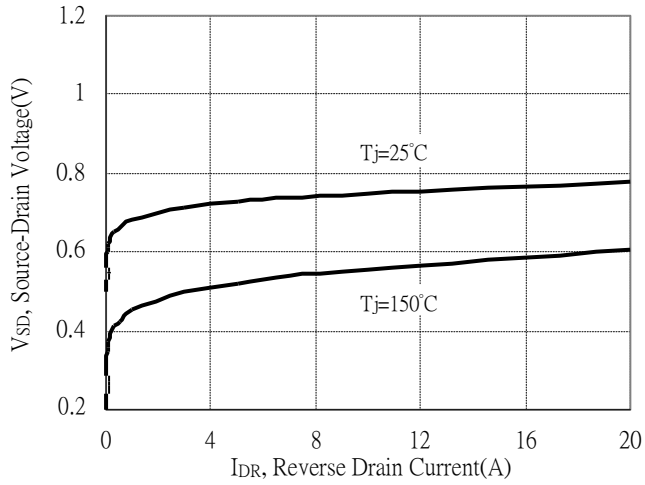
Brekdown Voltage vs Ambient Temperature



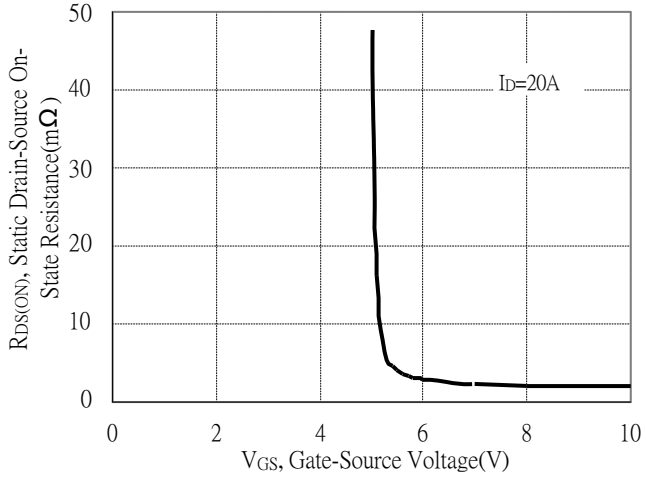
Static Drain-Source On-State resistance vs Drain Current



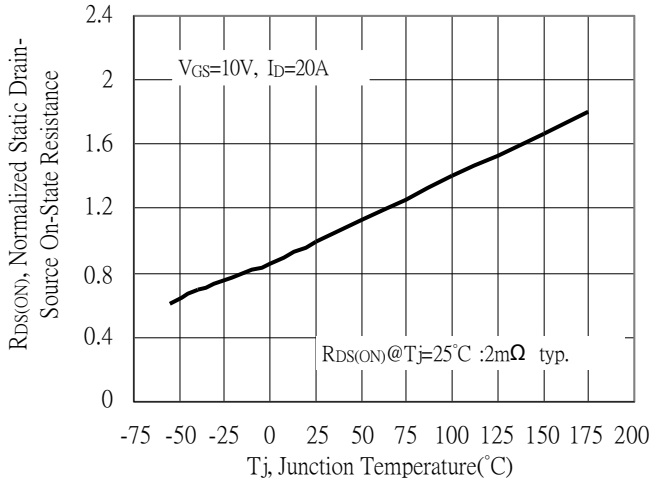
Reverse Drain Current vs Source-Drain Voltage



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

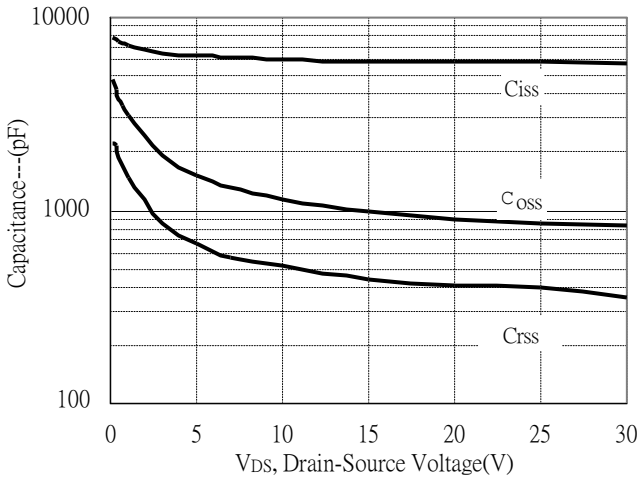


Drain-Source On-State Resistance vs Junction Tempearture

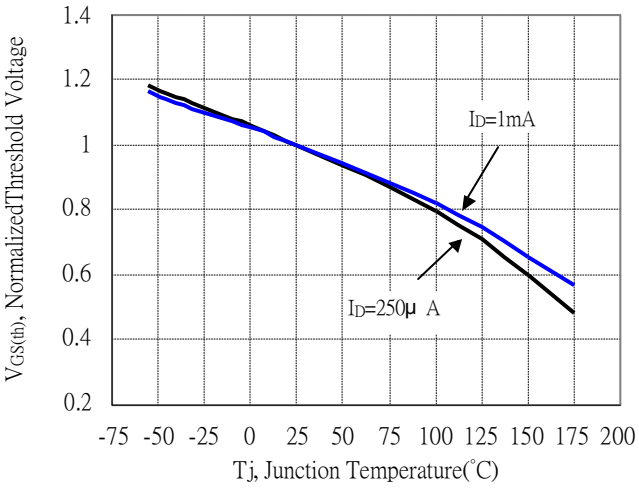


Typical Characteristics(Cont.)

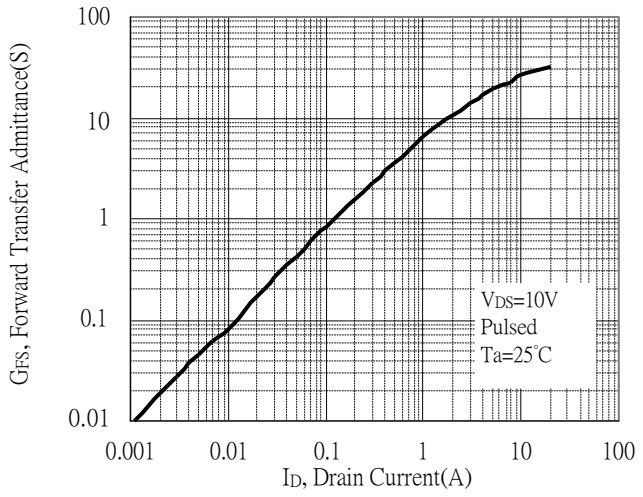
Capacitance vs Drain-to-Source Voltage



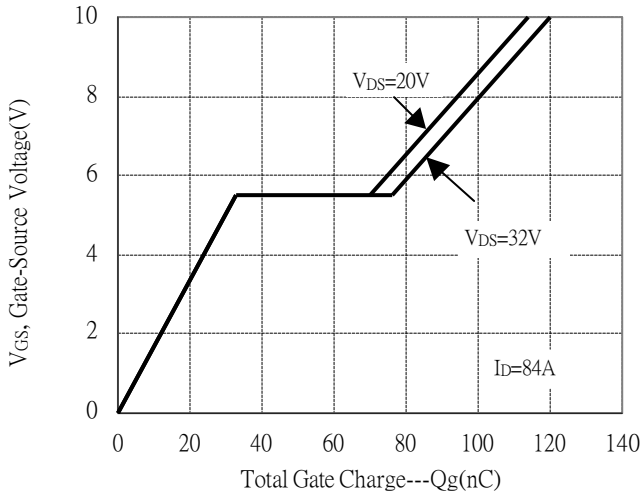
Threshold Voltage vs Junction Tempearture



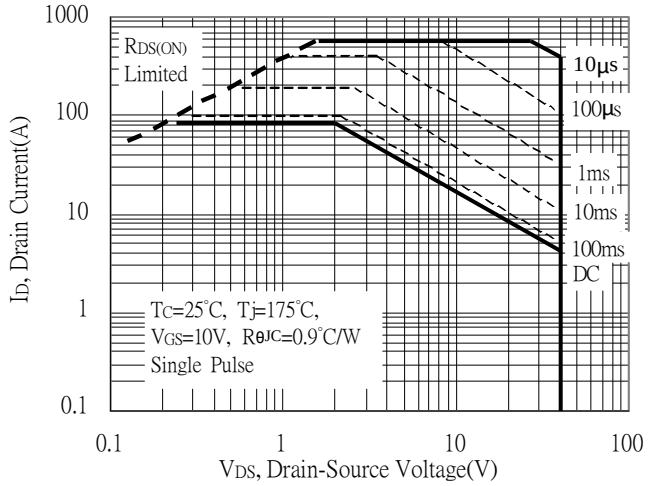
Forward Transfer Admittance vs Drain Current



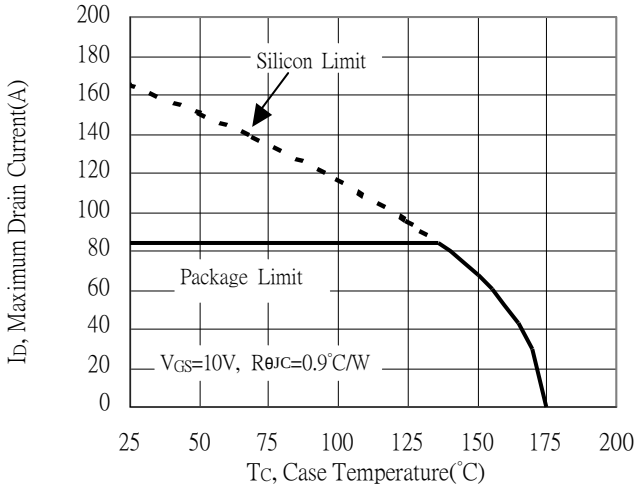
Gate Charge Characteristics



Maximum Safe Operating Area

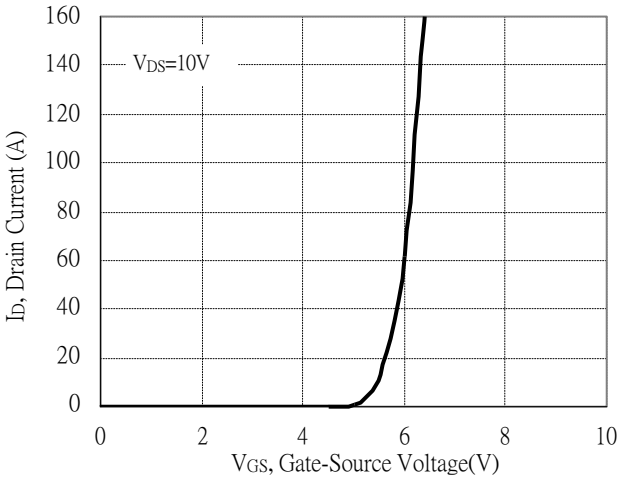


Maximum Drain Current vs Case Temperature

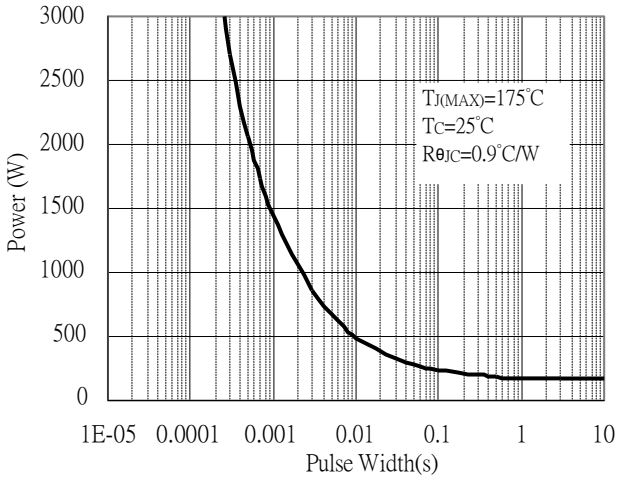


Typical Characteristics(Cont.)

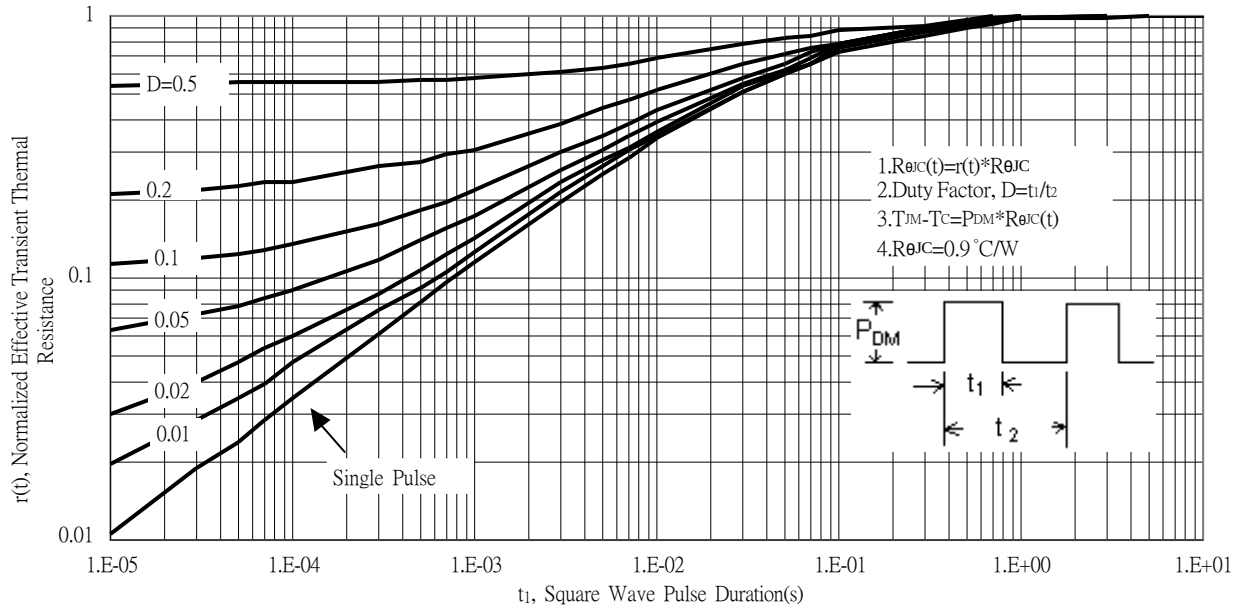
Typical Transfer Characteristics



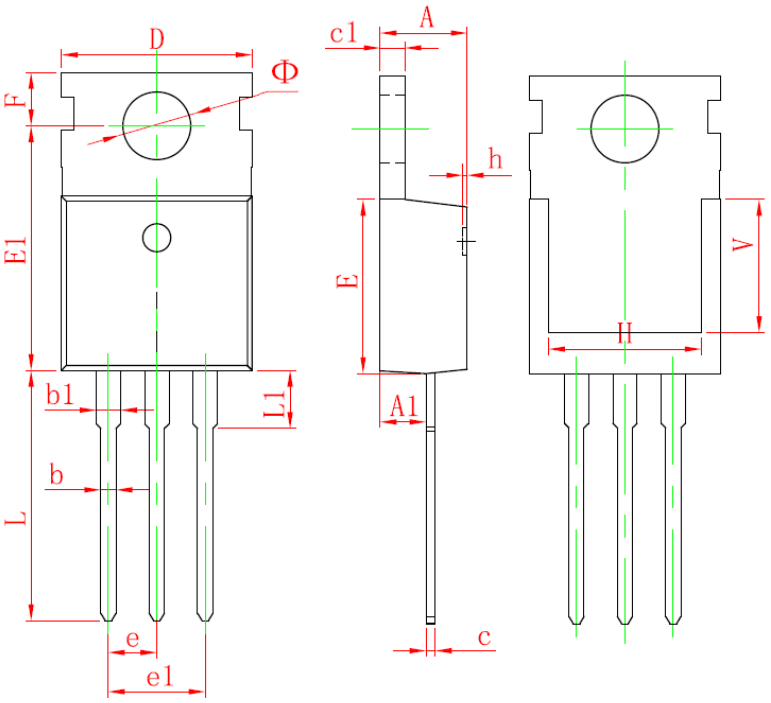
Single Pulse Maximum Power Dissipation



Transient Thermal Response Curves

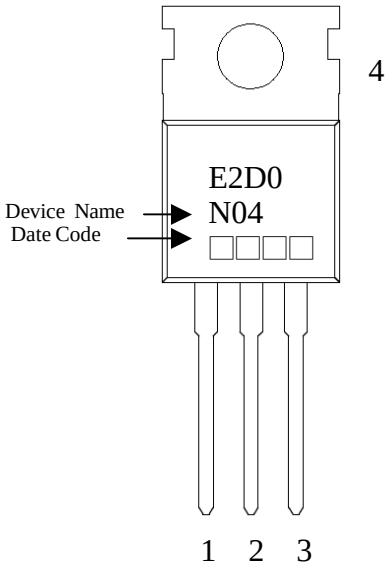


TO-220 Dimension



3-Lead TO-220 Plastic Package
Package Code: E3

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	7.500 REF		0.295 REF	
E1	12.650	12.950	0.498	0.510	Φ	3.400	3.800	0.134	0.150