

N-Channel Enhancement Mode Power MOSFET

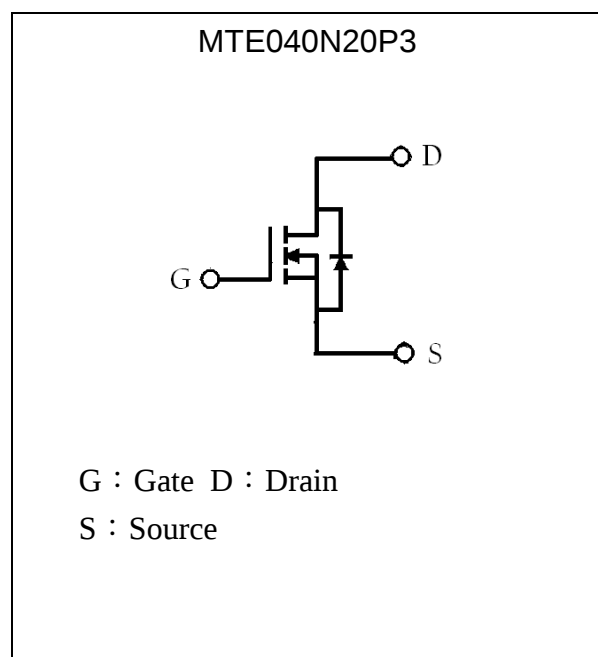
MTE040N20P3

BV_{DSS}	200V
I_D	50A
$R_{DS(ON)}@V_{GS}=10V, I_D=28A$	30.2m Ω (typ)
$R_{DS(ON)}@V_{GS}=6V, I_D=10A$	29.3m Ω (typ)

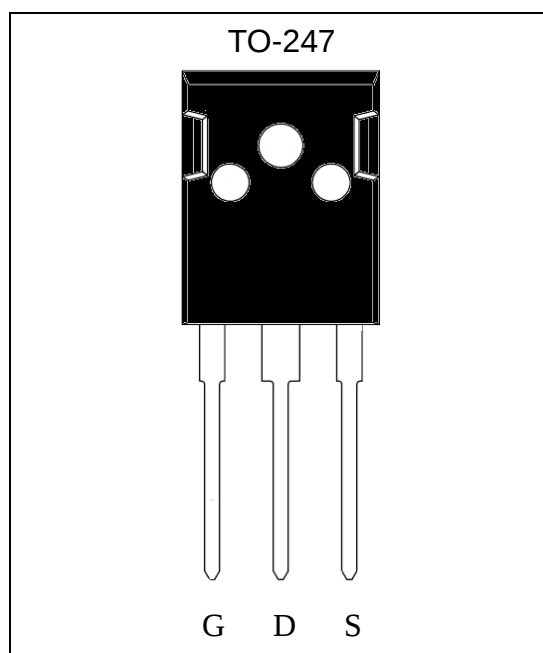
Features

- Low Gate Charge
- Simple Drive Requirement
- Pb-free lead plating package

Equivalent Circuit

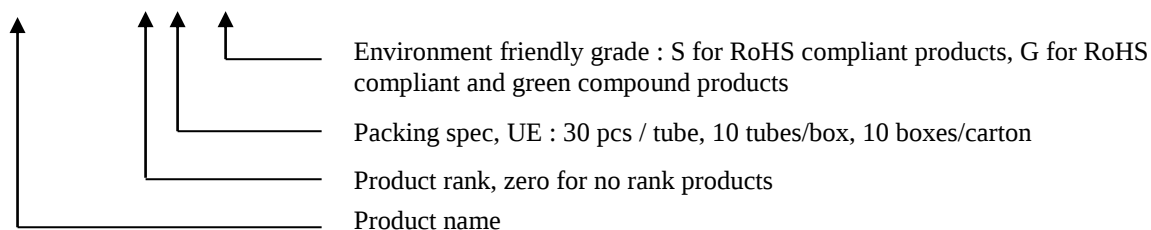


Outline



Ordering Information

Device	Package	Shipping
MTE040N20P3-0-UE-S	TO-247 (Pb-free lead plating package)	30 pcs / tube, 10 tubes/ box , 10 boxes/carton



**Absolute Maximum Ratings** (T_C=25°C, unless otherwise noted)

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V _{DS}	200	V
Gate-Source Voltage	V _{GS}	±20	
Continuous Drain Current @ T _C =25°C	I _D	50	A
Continuous Drain Current @ T _C =100°C	I _D	35	
Pulsed Drain Current *1	I _{DM}	200	
Avalanche Current	I _{AS}	14	
Avalanche Energy @ L=2mH, I _{AS} =14A, R _G =25Ω	E _{AS}	196	mJ
Repetitive Avalanche Energy @ L=0.05mH *2	E _{AR}	30	
Total Power Dissipation @T _C =25°C	P _d	300	W
Total Power Dissipation @T _C =100°C		150	
Operating Junction and Storage Temperature Range	T _j , T _{stg}	-55~+175	°C

Note : *1. Pulse width limited by maximum junction temperature

*2. Duty cycle ≤ 1%

Thermal Data

Parameter	Symbol	Value	Unit
Thermal Resistance, Junction-to-case, max	R _{th,j-c}	0.5	°C/W
Thermal Resistance, Junction-to-ambient, max	R _{th,j-a}	40	°C/W

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV _{DSS}	200	-	-	V	V _{GS} =0V, I _D =250μA
V _{GS(th)}	2.0	-	4.0	V	V _{DS} =V _{GS} , I _D =250μA
I _{GSS}	-	-	±100	nA	V _{GS} =±20V, V _{DS} =0V
I _{DSS}	-	-	1	μA	V _{DS} =200V, V _{GS} =0V
	-	-	25		V _{DS} =160V, V _{GS} =0V, T _J =125°C
R _{DS(ON)} *1	-	30.2	40	mΩ	V _{GS} =10V, I _D =28A
	-	29.3	46		V _{GS} =6V, I _D =10A
G _{FS} *1	-	44	-	S	V _{DS} =15V, I _D =28A
Dynamic					
Q _g *1, 2	-	98.5	-	nC	I _D =28A, V _{DS} =160V, V _{GS} =10V
Q _{gs} *1, 2	-	14.3	-		
Q _{gd} *1, 2	-	38.4	-		
t _{d(ON)} *1, 2	-	32	-	ns	V _{DS} =100V, I _D =28A, V _{GS} =10V, R _G =1.8Ω
t _r *1, 2	-	29	-		
t _{d(OFF)} *1, 2	-	70	-		
t _f *1, 2	-	17	-		



Ciss	-	4467	-	pF	V _{GS} =0V, V _{DS} =25V, f=1MHz
Coss	-	392	-		
Crss	-	341	-		
Rg	-	0.6	-	Ω	f=1MHz
Source-Drain Diode					
I _S *1	-	-	50	A	
I _{SM} *3	-	-	200		
V _{SD} *1	-	0.81	1.2	V	I _S =28A, V _{GS} =0V
trr	-	79	-	ns	I _F =28A, dI _F /dt=100A/μs
Qrr	-	300	-	nC	

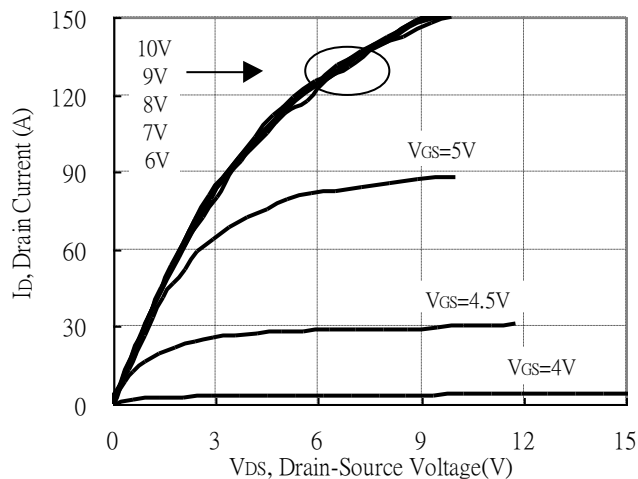
Note : *1.Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

*2.Independent of operating temperature

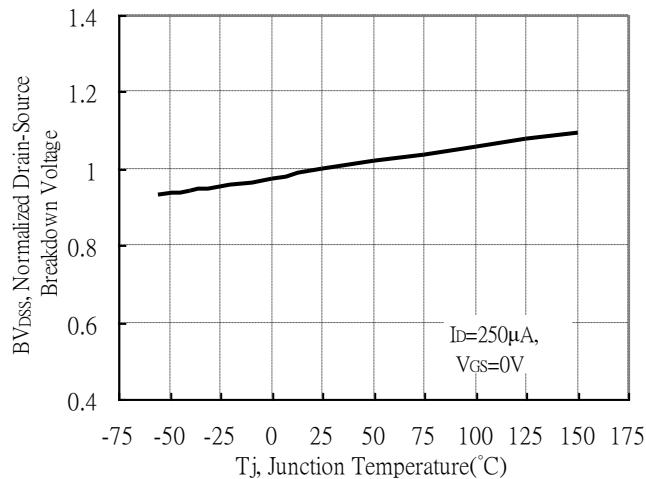
*3.Pulse width limited by maximum junction temperature.

Typical Characteristics

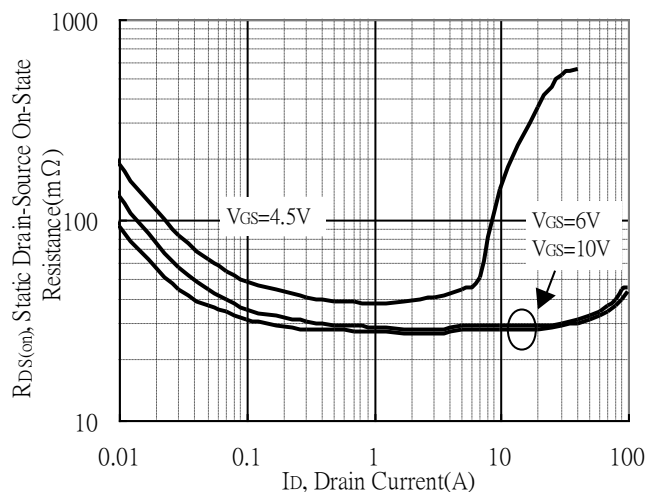
Typical Output Characteristics



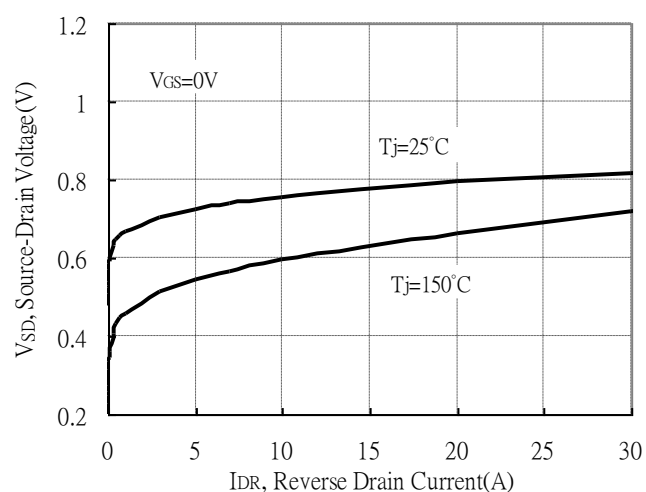
Brekdown Voltage vs Ambient Temperature



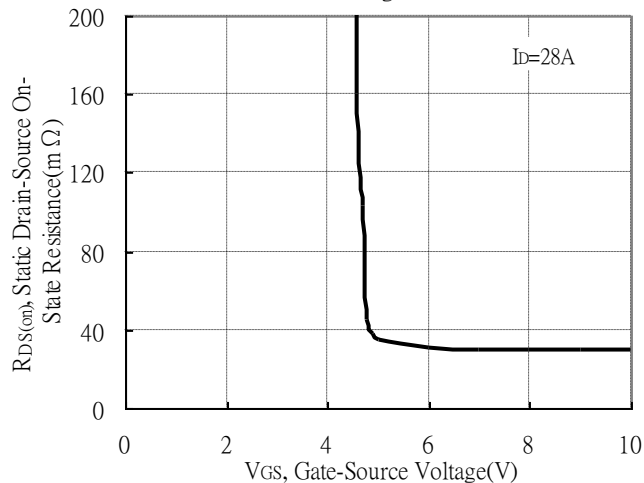
Static Drain-Source On-State resistance vs Drain Current



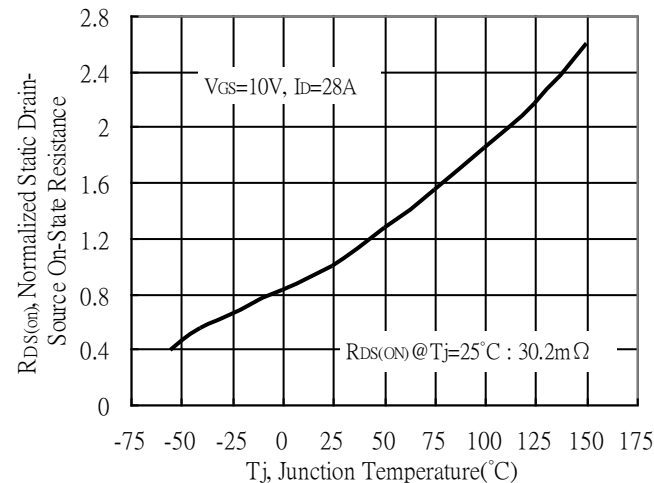
Reverse Drain Current vs Source-Drain Voltage



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

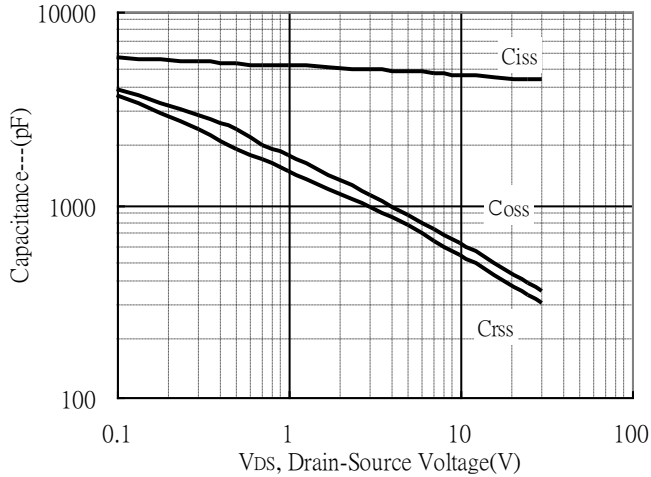


Drain-Source On-State Resistance vs Junction Temperature

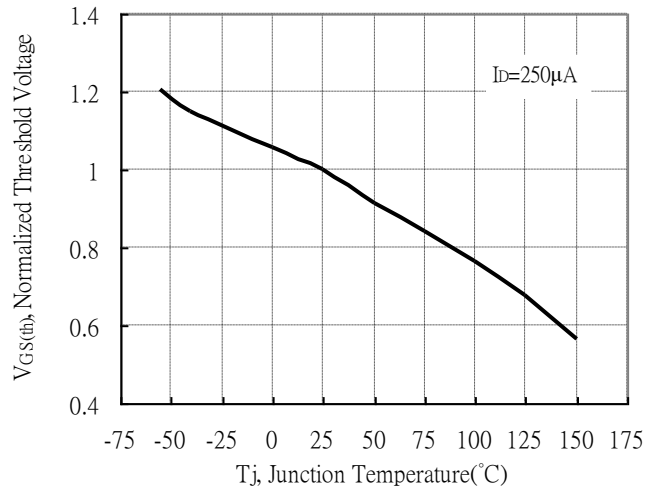


Typical Characteristics (Cont.)

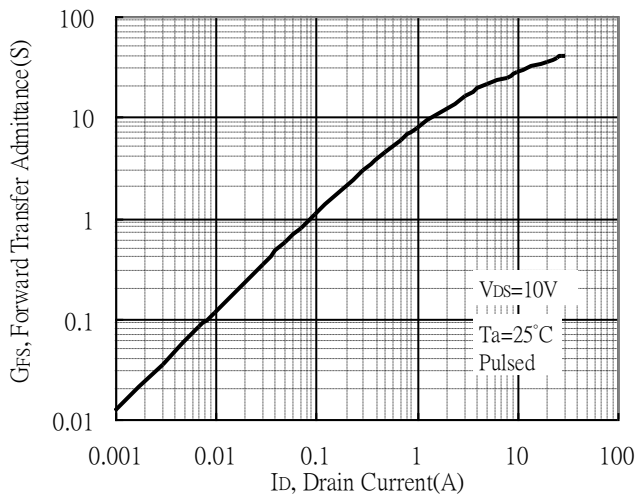
Capacitance vs Drain-to-Source Voltage



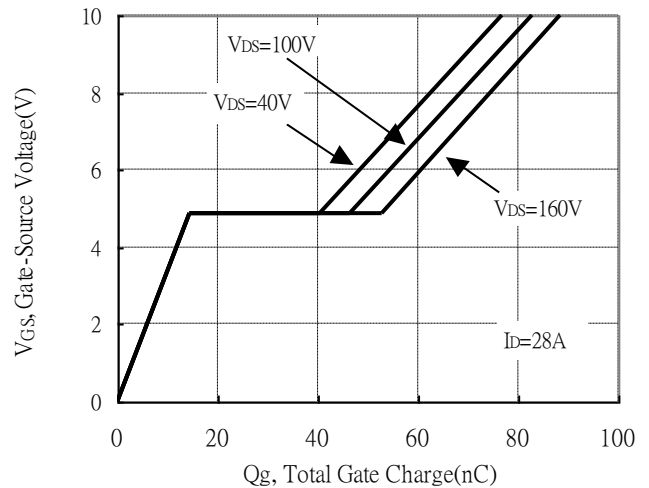
Threshold Voltage vs Junction Temperature



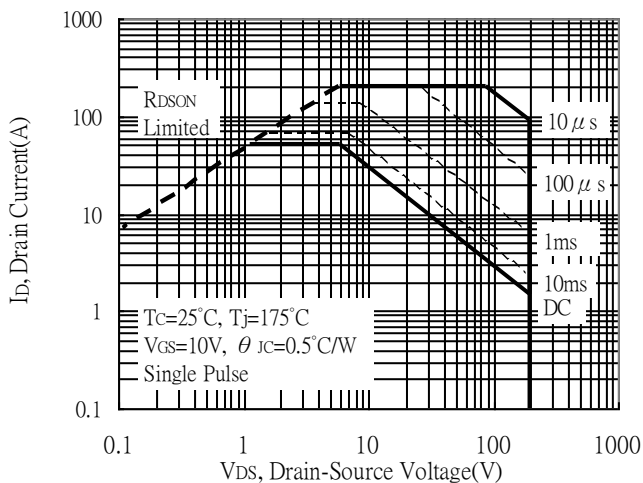
Forward Transfer Admittance vs Drain Current



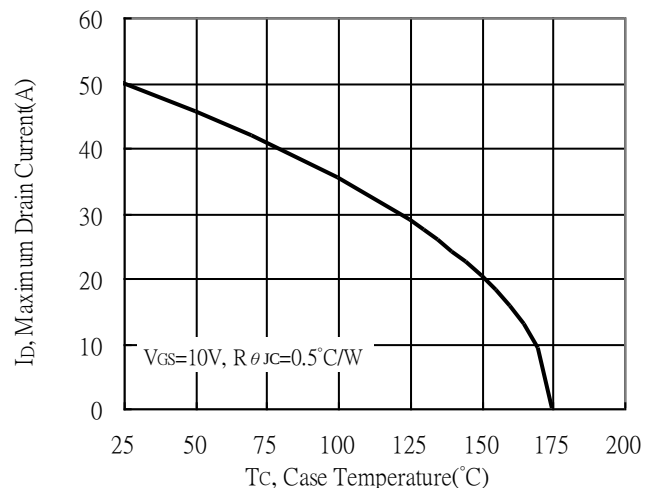
Gate Charge Characteristics



Maximum Safe Operating Area

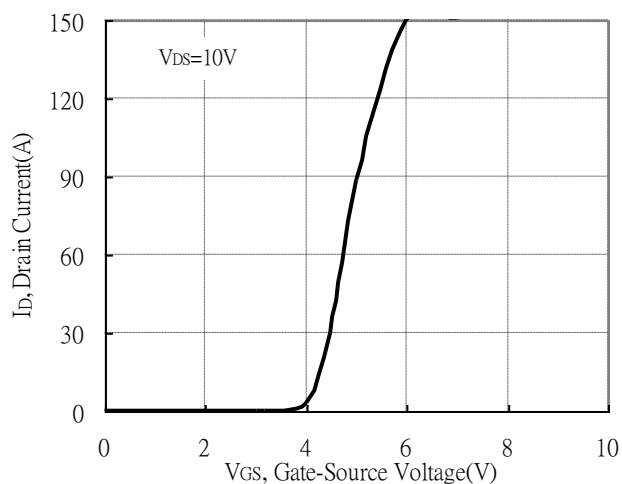


Maximum Drain Current vs Case Temperature

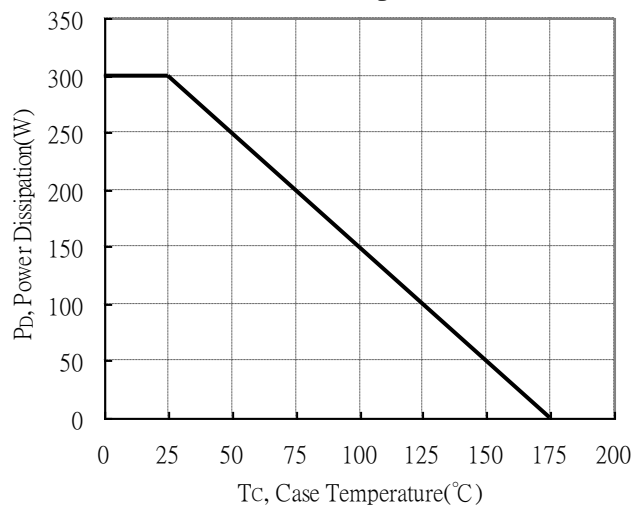


Typical Characteristics (Cont.)

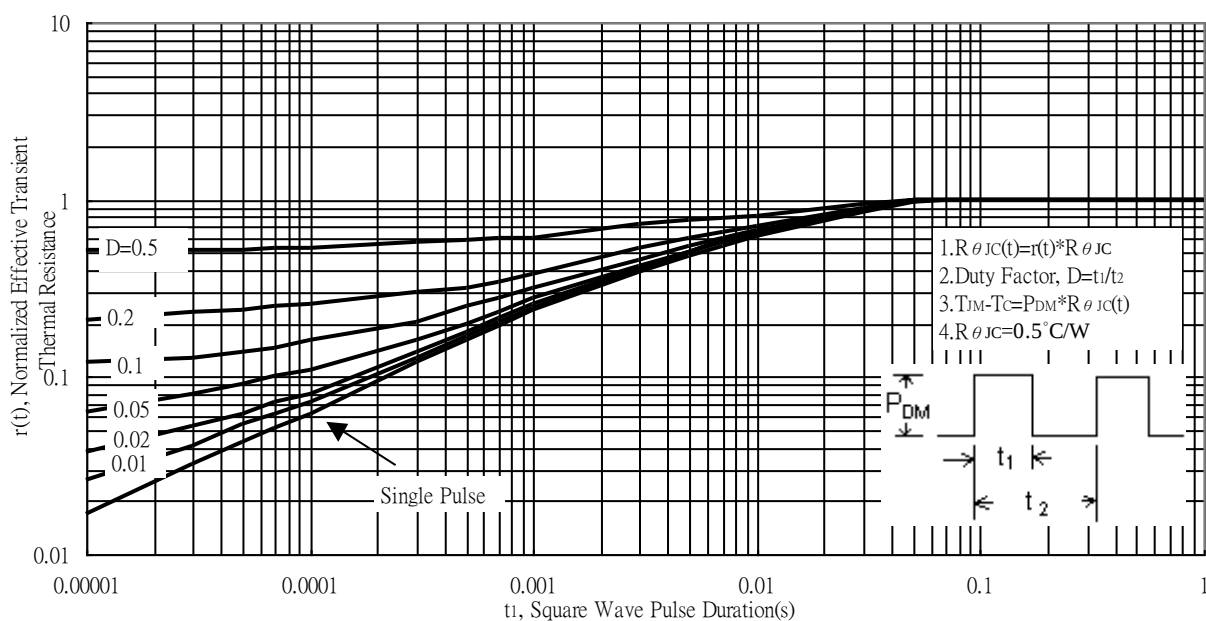
Typical Transfer Characteristics



Power Derating Curve



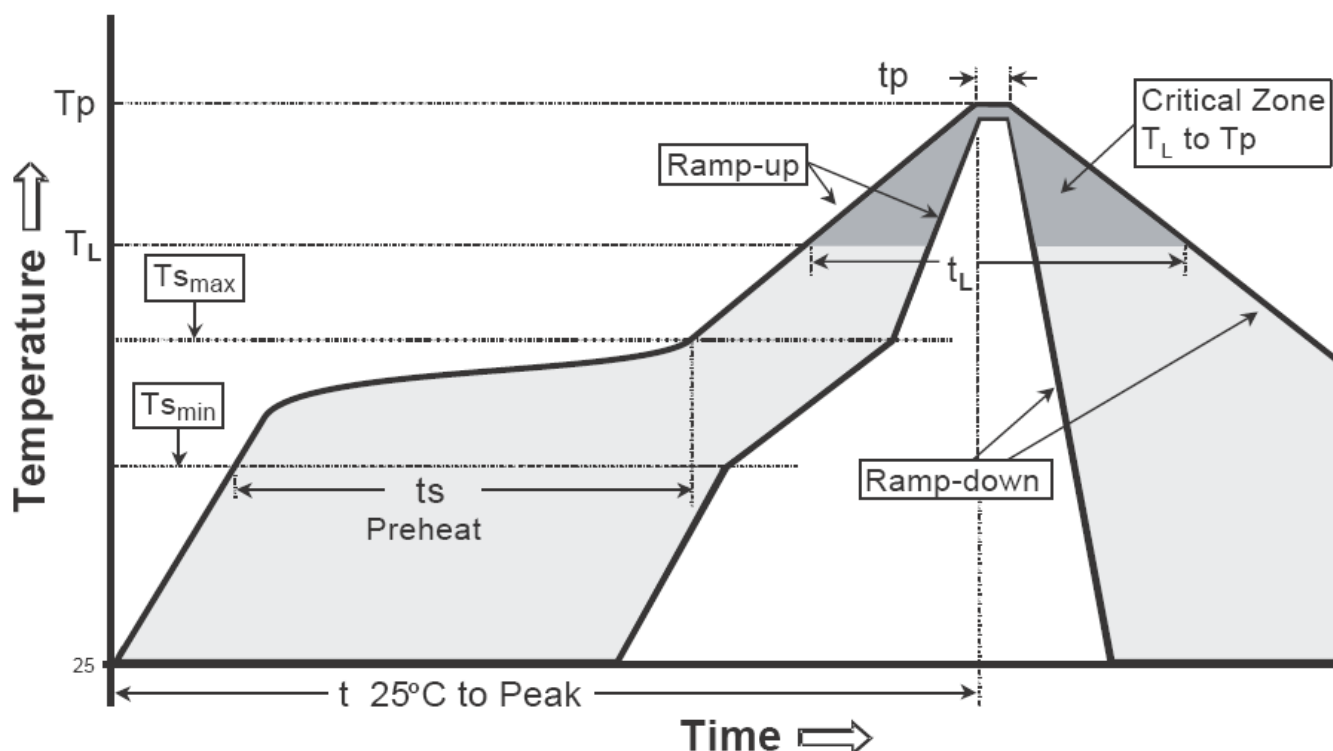
Transient Thermal Response Curves



Recommended wave soldering condition

Product	Peak Temperature	Soldering Time
Pb-free devices	260 +0/-5 °C	5 +1/-1 seconds

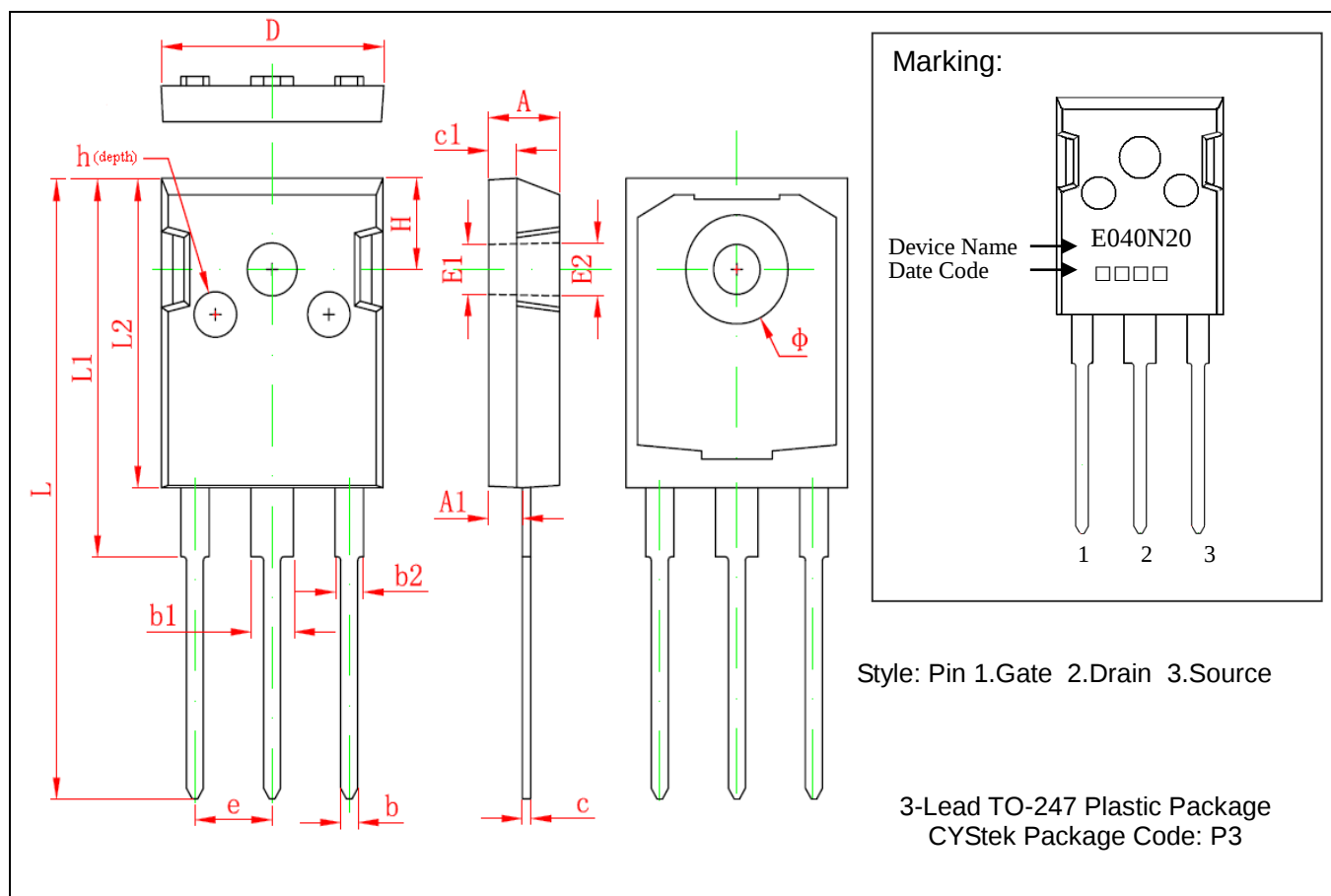
Recommended temperature profile for IR reflow



Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat		
-Temperature Min(Ts min)	100°C	150°C
-Temperature Max(Ts max)	150°C	200°C
-Time(ts min to ts max)	60-120 seconds	60-180 seconds
Time maintained above:		
-Temperature (Tl)	183°C	217°C
- Time (tL)	60-150 seconds	60-150 seconds
Peak Temperature(Tp)	240 +0/-5 °C	260 +0/-5 °C
Time within 5°C of actual peak temperature(tp)	10-30 seconds	20-40 seconds
Ramp down rate	6°C/second max.	6°C/second max.
Time 25 °C to peak temperature	6 minutes max.	8 minutes max.

Note : All temperatures refer to topside of the package, measured on the package body surface.

TO-247 Dimension



DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.191	0.200	4.850	5.150	E2	0.142 REF		3.600	REF
A1	0.087	0.102	2.200	2.600	L	1.610	1.626	40.900	41.300
b	0.039	0.055	1.000	1.400	L1	0.976	0.988	24.800	25.100
b1	0.110	0.126	2.800	3.200	L2	0.799	0.811	20.300	20.600
b2	0.071	0.087	1.800	2.200	Φ	0.280	0.287	7.100	7.300
c	0.020	0.028	0.500	0.700	e	0.215 REF		5.450	REF
c1	0.075	0.083	1.900	2.100	H	0.235 REF		5.980	REF
D	0.608	0.620	15.450	15.750	h	0.000	0.012	0.000	0.300
E1	0.138 REF		3.500 REF						

Notes: 1.Controlling dimension: millimeters.

2.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.

3.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

Material:

- Lead: Pure tin plated.
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0.

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