N-Channel Enhancement Mode Power MOSFET

MTE65N15FP

BV_{DSS}	**150V**
I_D	**15A**
$R_{DS(ON)}$@V_{GS}=10V, I_D=15A	**55 mΩ(typ)**
$R_{DS(ON)}$@V_{GS}=6V, I_D=10A	**61mΩ(typ)**

Description

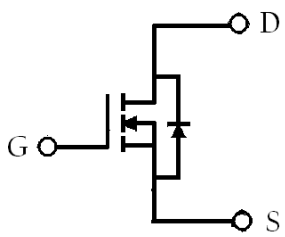
The MTE65N15FP is a N-channel enhancement-mode MOSFET, providing the designer with the best combination of fast switching, ruggedized device design, low on-resistance and cost effectiveness.
The TO-220FP package is universally preferred for all commercial-industrial applications

Features

- Low On Resistance
- Simple Drive Requirement
- Low Gate Charge
- Fast Switching Characteristic
- Insulating package, front/back side insulating voltage=2500V(AC)
- RoHS compliant package

Symbol

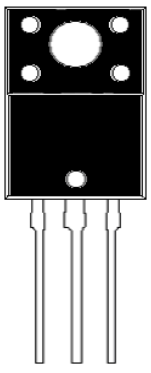
MTE65N15FP



G：Gate
D：Drain
S：Source

Outline

TO-220FP



G D S

Absolute Maximum Ratings (T_C=25°C)

Parameter		Symbol	Limits	Unit
Drain-Source Voltage (Note 1)		V_{DS}	150	V
Gate-Source Voltage		V_{GS}	±30	
Continuous Drain Current @T_C=25°C, V_{GS}=10V (Note 1)		I_D	15*	A
Continuous Drain Current @T_C=100°C, V_{GS}=10V (Note 1)			10*	
Continuous Drain Current @T_A=25°C, V_{GS}=10V (Note 2)		I_{DSM}	3.7	
Continuous Drain Current @T_A=70°C, V_{GS}=10V (Note 2)			3	
Pulsed Drain Current @ V_{GS}=10V (Note 3)		I_{DM}	60*	
Avalanche Current (Note 3)		I_{AR}	10	
Single Pulse Avalanche Energy @ L=0.1mH, I_D=10 Amps, V_{DD}=50V (Note 2)		E_{AS}	5	mJ
Repetitive Avalanche Energy (Note 3)		E_{AR}	3.5	
Power Dissipation	T_C=25°C (Note 1)	P_D	35	W
	T_C=100°C (Note 1)		17	
	T_A=25°C (Note 2)	P_{DSM}	2.1	
	T_A=70°C (Note 2)		1.4	
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	$R_{\theta JC}$	4.3	°C/W
Thermal Resistance, Junction-to-ambient, max (Note 2)	$R_{\theta JA}$	58	°C/W

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

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	150	-	-	V	V_{GS}=0V, I_D=250μA
$\Delta BV_{DSS}/\Delta Tj$	-	0.1	-	V/°C	Reference to 25°C, I_D=250μA
$V_{GS(th)}$	2.0	3.7	4.0	V	V_{DS} = V_{GS}, I_D=250μA
*G_{FS}	-	19	-	S	V_{DS} =5V, I_D=10A
I_{GSS}	-	-	±100	nA	V_{GS}=±30V
I_{DSS}	-	-	10	μA	V_{DS} =120V, V_{GS} =0V
I_{DSS}	-	-	100		V_{DS} =120V, V_{GS} =0V, Tj=125°C
*$R_{DS(ON)}$	-	55	75	mΩ	V_{GS} =10V, I_D=15A
	-	61	85		V_{GS} =6V, I_D=10A
Dynamic					
*Qg	-	20	-	nC	V_{DD}=75V, I_D=15A,V_{GS}=10V
*Qgs	-	5.5	-		
*Qgd	-	7	-		
*$t_{d(ON)}$	-	6	-	ns	V_{DD}=75V, I_D=10A, V_{GS}=10V, R_G=3Ω
*tr	-	5	-		
*$t_{d(OFF)}$	-	13	-		
*t_f	-	6	-		
Ciss	-	1274	-	pF	V_{GS}=0V, V_{DS}=30V, f=1MHz
Coss	-	117	-		
Crss	-	49	-		
Source-Drain Diode					
*I_S	-	-	3	A	
*I_{SM}	-	-	12		
*V_{SD}	-	0.74	1.2	V	I_S=3A, V_{GS}=0V
*trr	-	30	-	ns	V_{GS}=0, I_F=10A, dI/dt=100A/μs
*Qrr	-	100	-	nC	

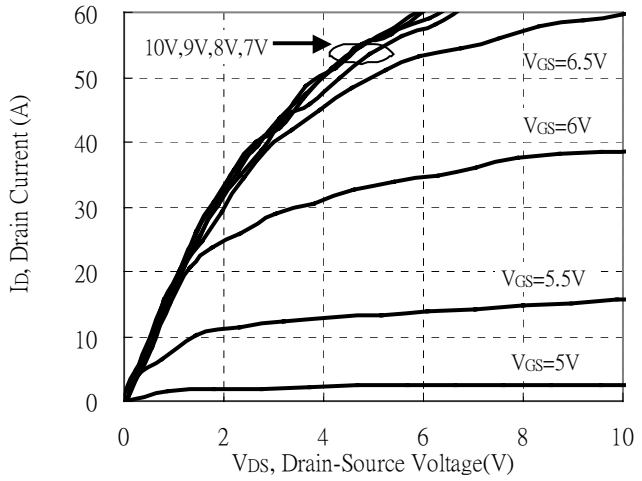
*Pulse Test : Pulse Width ≤300μs, Duty Cycle≤2%

Ordering Information

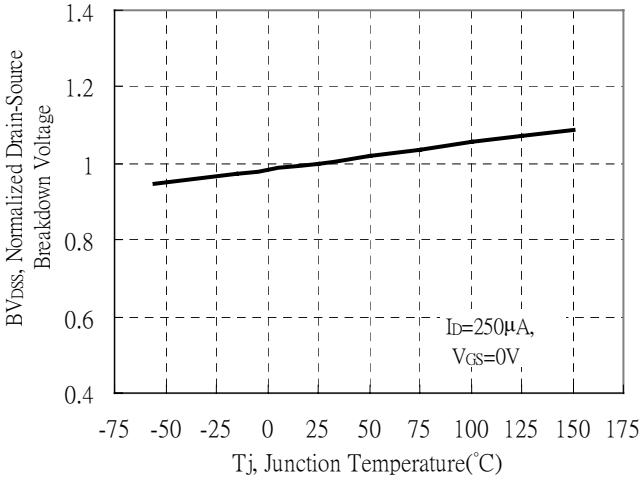
Device	Package	Shipping
MTE65N15FP-0-UB-S	TO-220FP (RoHS compliant)	50 pcs/tube, 20 tubes/box, 4 boxes / carton

Typical Characteristics

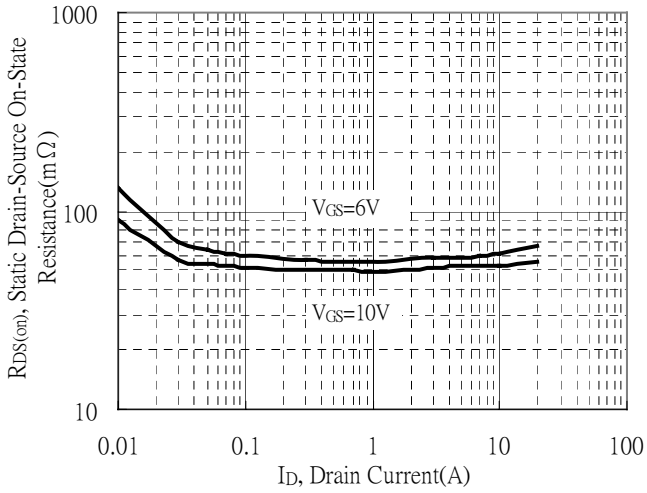
Typical Output Characteristics



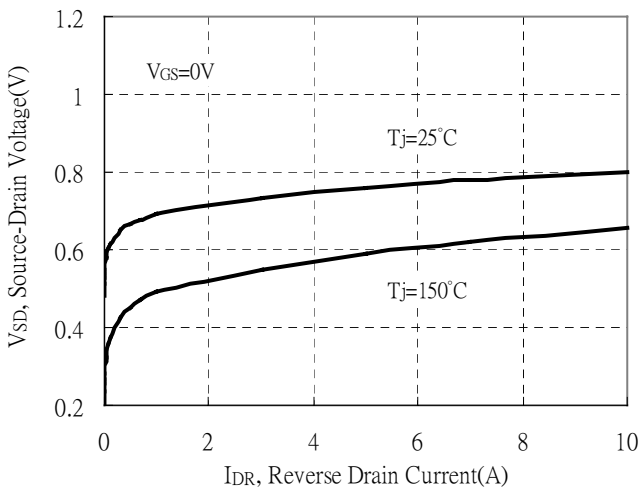
Brekdown Voltage vs Ambient Temperature



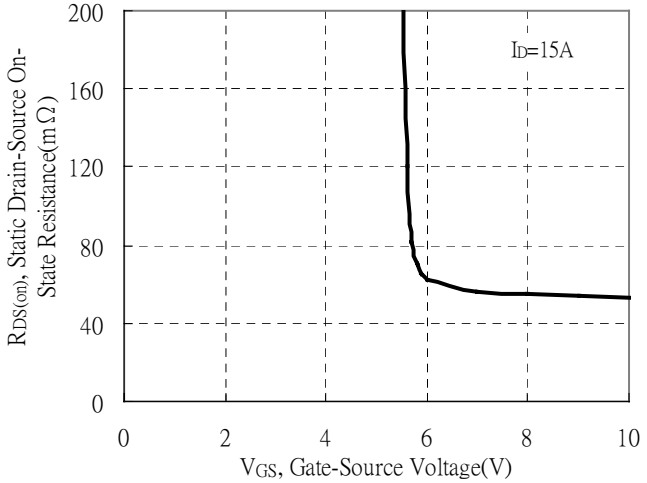
Static Drain-Source On-State resistance vs Drain Current



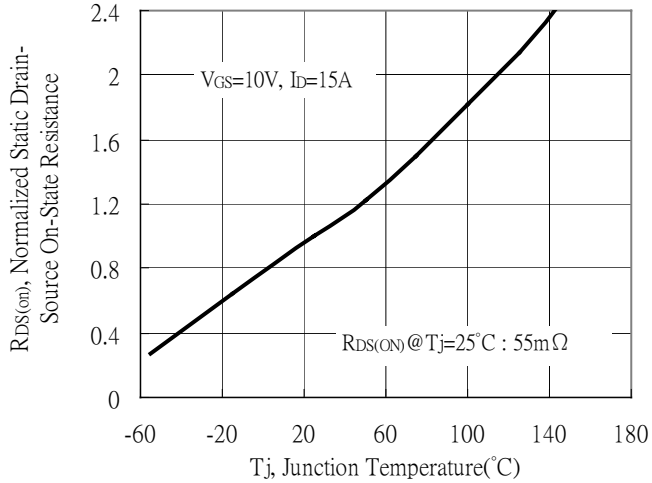
Reverse Drain Current vs Source-Drain Voltage



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

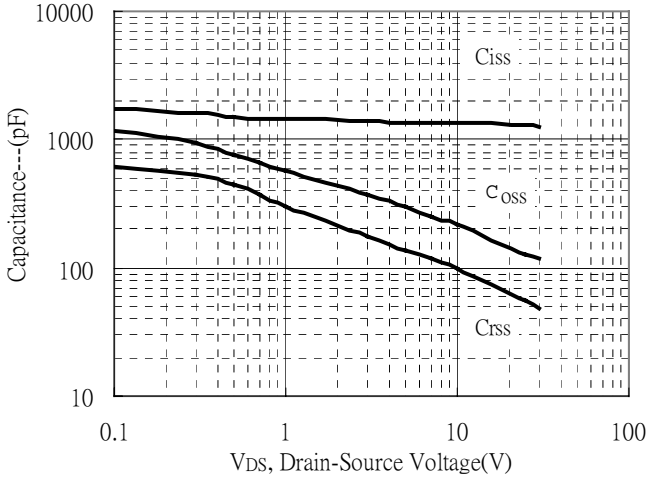


Drain-Source On-State Resistance vs Junction Tempearture

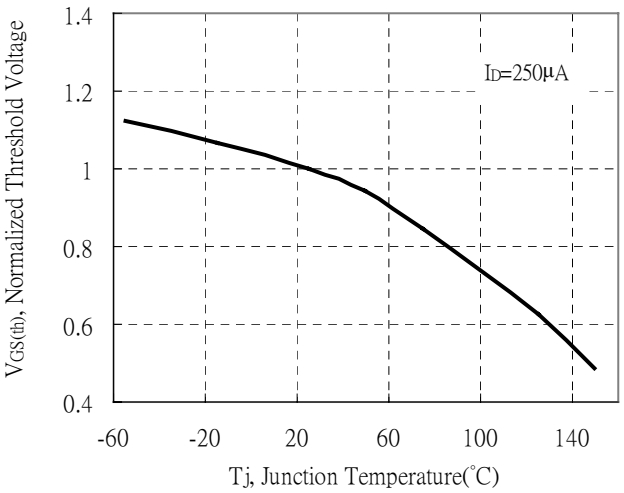


Typical Characteristics(Cont.)

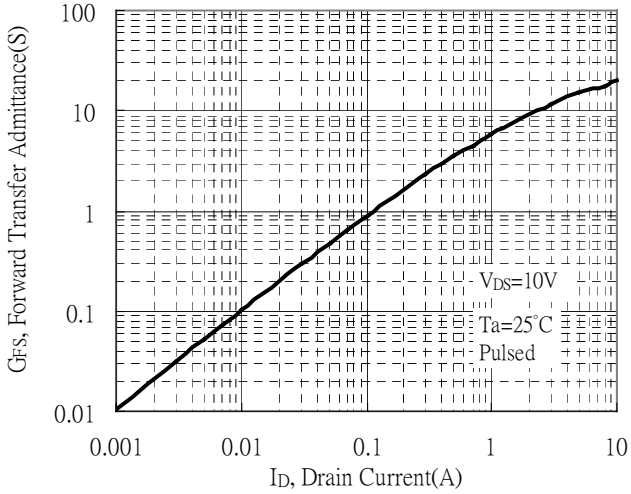
Capacitance vs Drain-to-Source Voltage



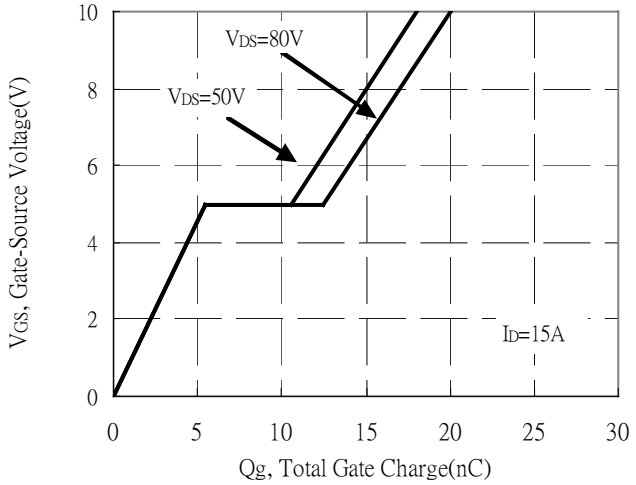
Threshold Voltage vs Junction Tempearture



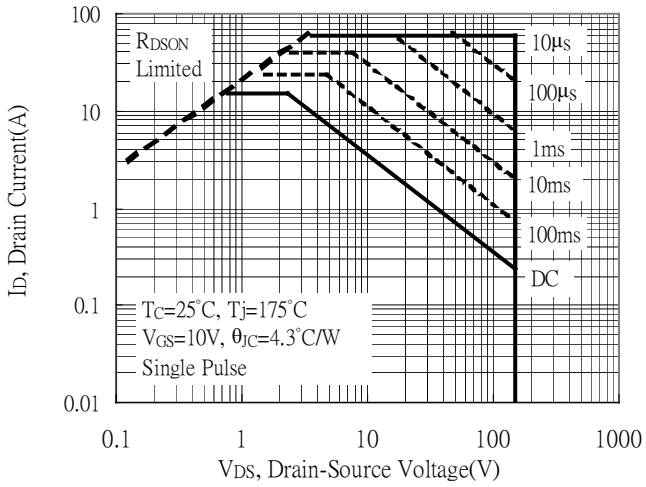
Forward Transfer Admittance vs Drain Current



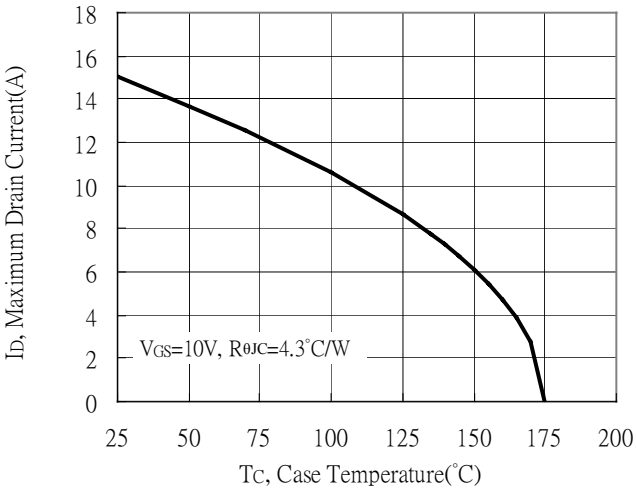
Gate Charge Characteristics



Maximum Safe Operating Area

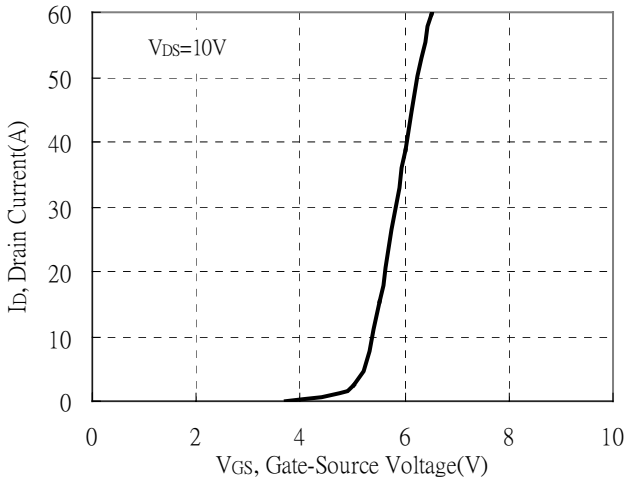


Maximum Drain Current vs Case Temperature

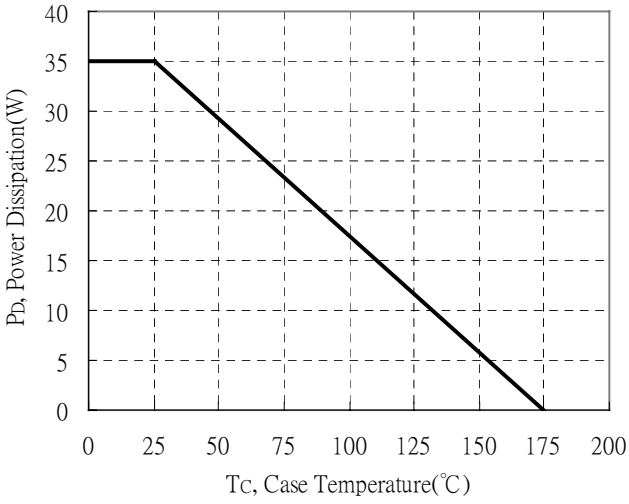


Typical Characteristics(Cont.)

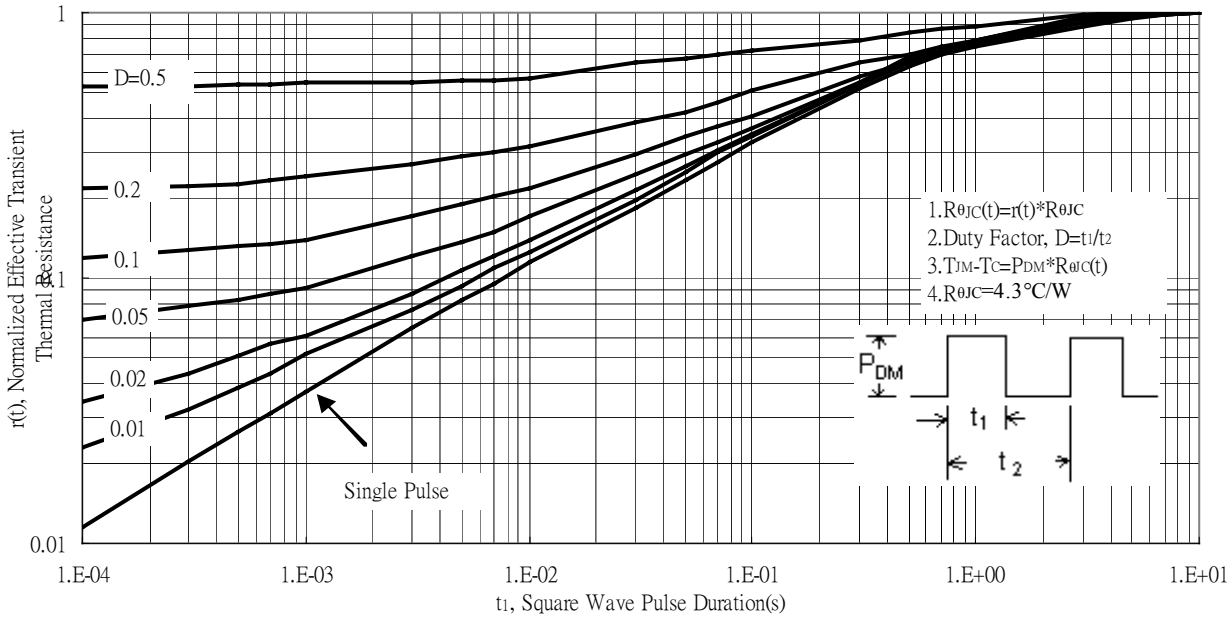
Typical Transfer Characteristics



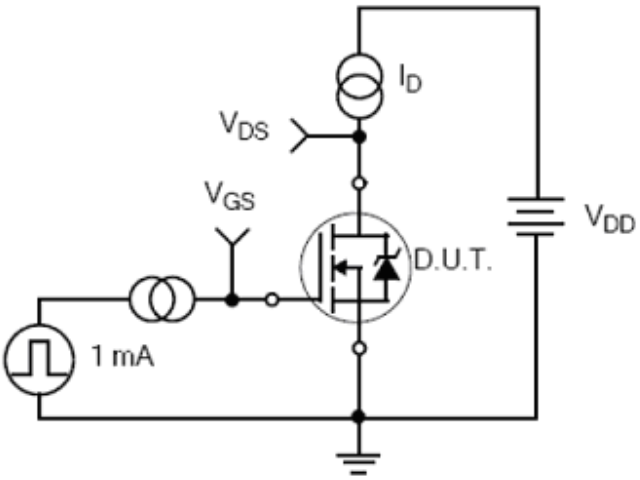
Power Derating Curve



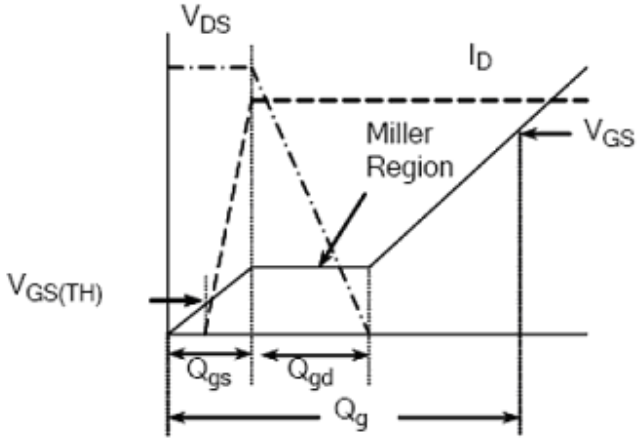
Transient Thermal Response Curves



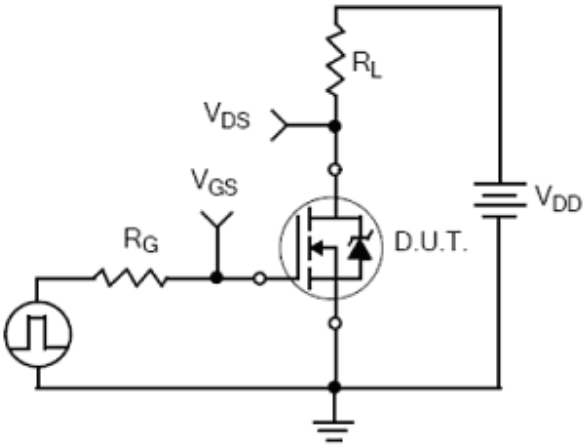
Test Circuit and Waveforms



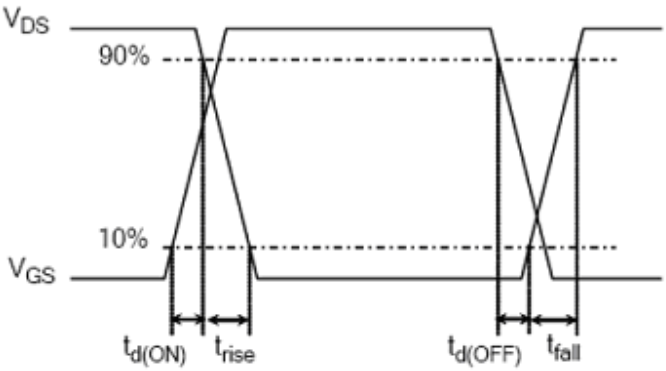
Gate Charge Test Circuit



Gate Charge Waveform

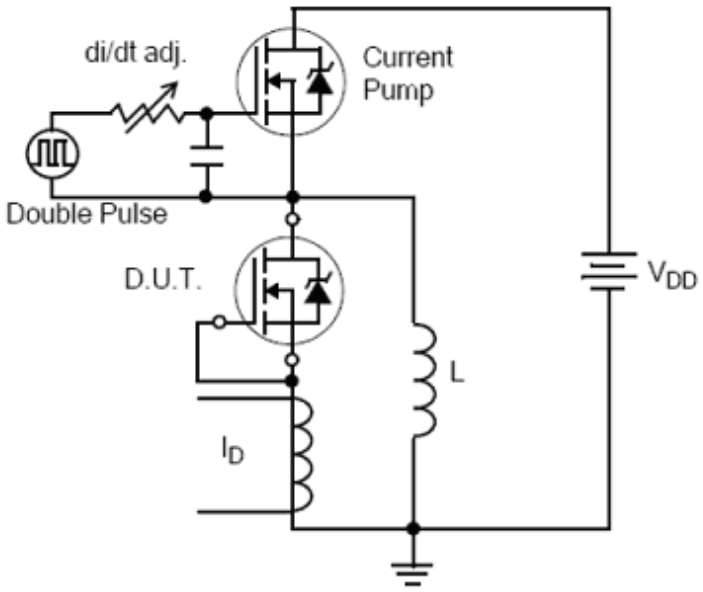


Resistive Switching Test Circuit

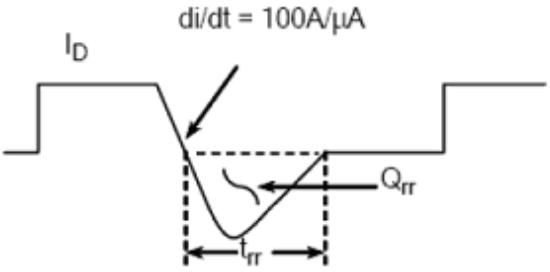


Resistive Switching Waveforms

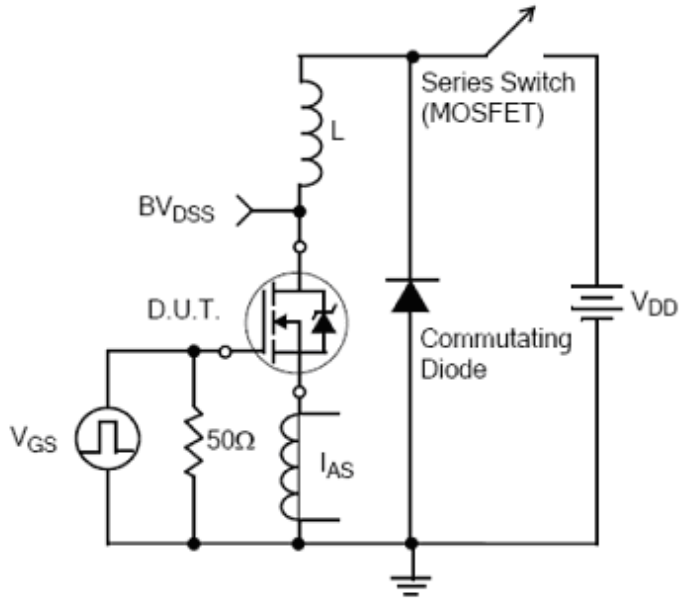
Test Circuit and Waveforms(Cont.)



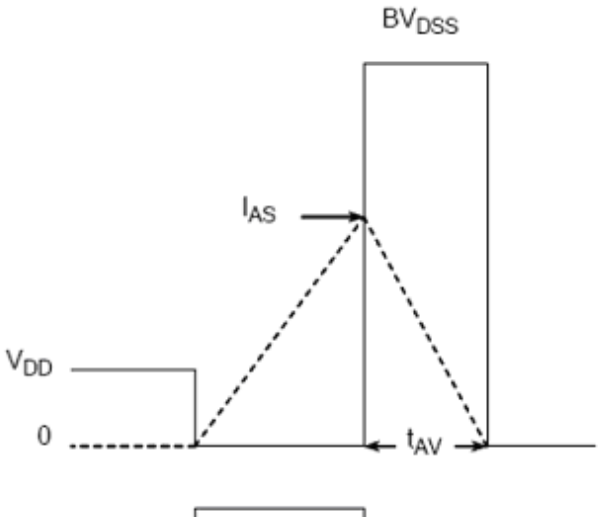
Diode Reverse Recovery Test Circuit



Diode Reverse Recovery Waveform



Unclamped Inductive Switching Test Circuit



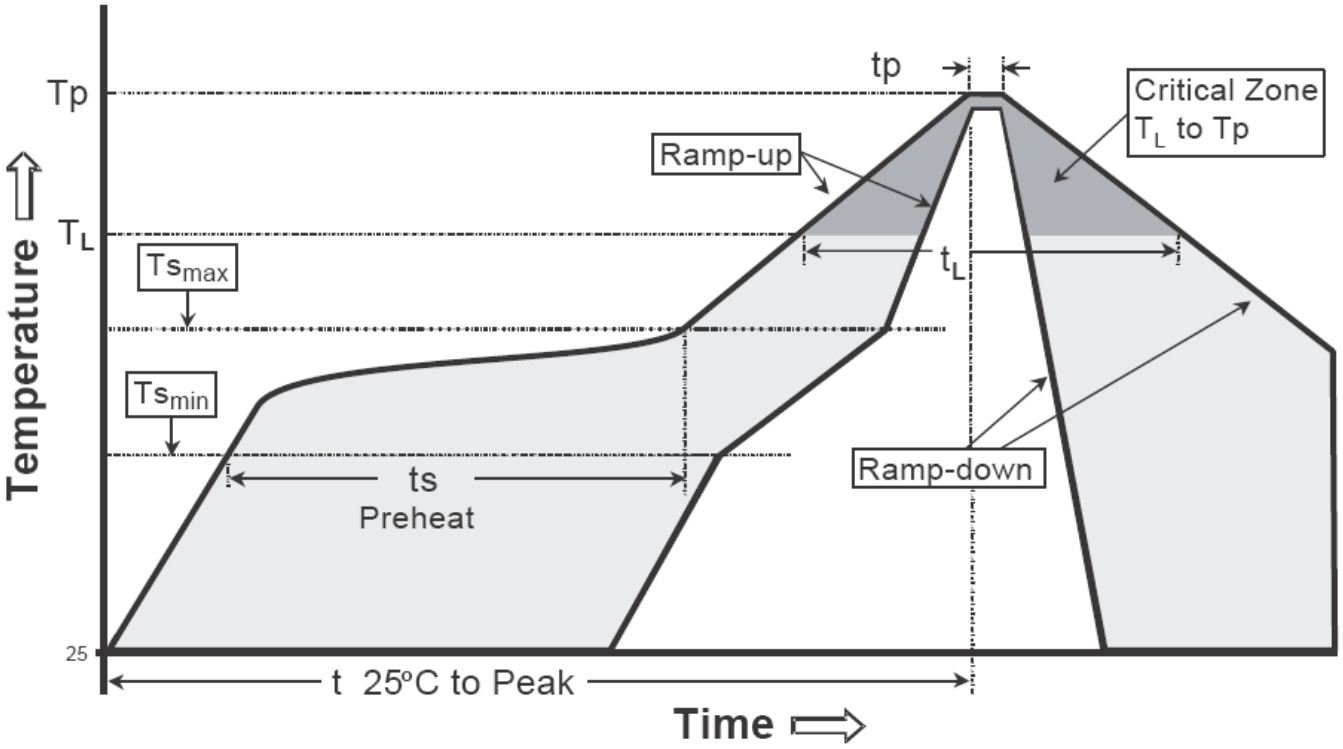
$$E_{AS} = \frac{I_{AS}^2 L}{2}$$

Unclamped Inductive Switching Waveforms

Recommended wave soldering condition

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

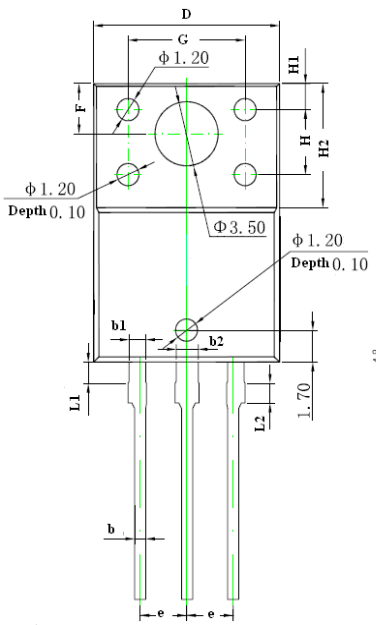
Recommended temperature profile for IR reflow

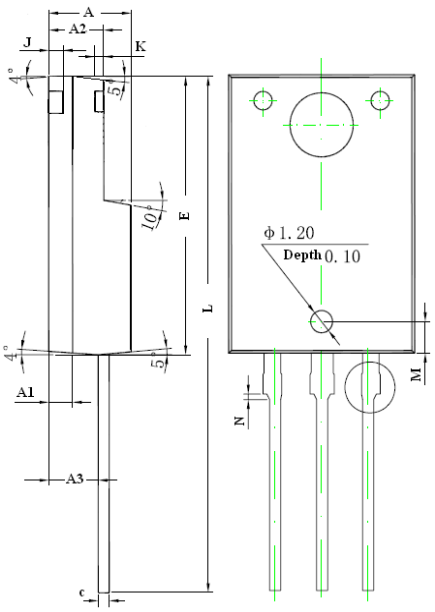


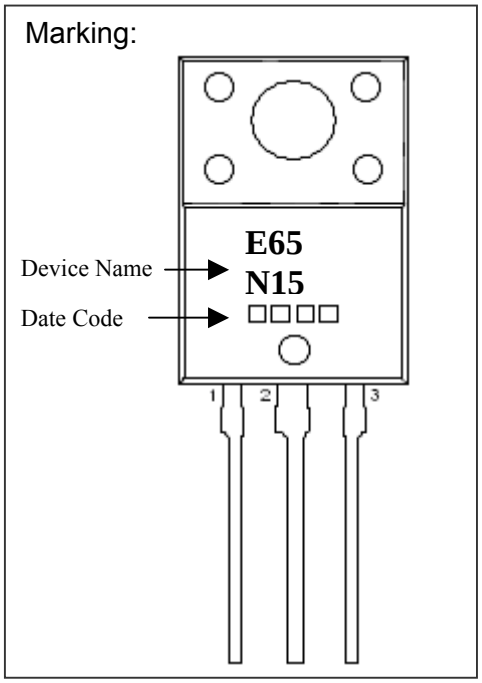
Profile feature	Sn-Pb eutectic Assembly	Pb-free Assembly
Average ramp-up rate (Tsmax to Tp)	3°C/second max.	3°C/second max.
Preheat −Temperature Min(T_S min) −Temperature Max(T_S max) −Time($t_{s\ min}$ to $t_{s\ max}$)	 100°C 150°C 60-120 seconds	 150°C 200°C 60-180 seconds
Time maintained above: −Temperature (T_L) − Time (t_L)	 183°C 60-150 seconds	 217°C 60-150 seconds
Peak Temperature(T_P)	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-220FP Dimension







3-Lead TO-220FP Plastic Package
CYStek Package Code: FP

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

*Typical

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.171	0.183	4.35	4.65	G	0.246	0.258	6.25	6.55
A1	0.051 REF		1.300 REF		H	0.138 REF		3.50 REF	
A2	0.112	0.124	2.85	3.15	H1	0.055 REF		1.40 REF	
A3	0.102	0.110	2.60	2.80	H2	0.256	0.272	6.50	6.90
b	0.020	0.030	0.50	0.75	J	0.031 REF		0.80 REF	
b1	0.031	0.041	0.80	1.05	K	0.020		0.50 REF	
b2	0.047 REF		1.20 REF		L	1.102	1.118	28.00	28.40
c	0.020	0.030	0.500	0.750	L1	0.043	0.051	1.10	1.30
D	0.396	0.404	10.06	10.26	L2	0.036	0.043	0.92	1.08
E	0.583	0.598	14.80	15.20	M	0.067 REF		1.70 REF	
e	0.100 *		2.54*		N	0.012 REF		0.30 REF	
F	0.106 REF		2.70 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.