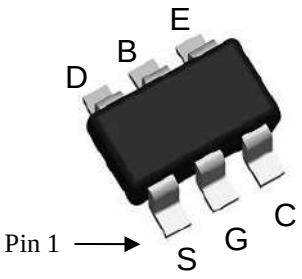
N- Channel Enhancement mode MOSFET AND NPN BJT Complex Device

Features:

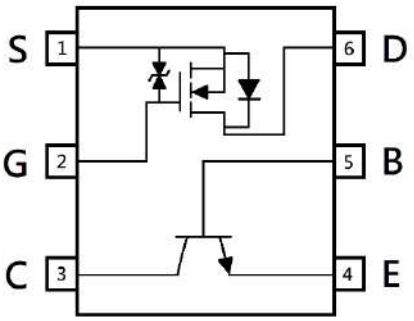
- ESD protected gate, typical 2kV (HBM)
- High speed switching
- Easily designed drive circuits
- Low-voltage drive
- Easy to use in parallel
- The KWMBNN01 consists of a N-channel enhancement-mode MOSFET and a NPN BJT in a single SOT-363 package.

SOT-363



BV_{DSS}	60V
I_D@V_{GS}=4.5V, T_A=25°C	200mA
$R_{DS(ON)\ typ.}$@V_{GS}=4.5V, I_D=200mA	1.3Ω
$R_{DS(ON)\ typ.}$@V_{GS}=2.5V, I_D=100mA	1.7Ω

V_{CEO}	50V
I_C	200mA
$V_{CE(sat)\ max.}$@I_C=100mA, I_B=5mA	300mV



G : Gate S : Source D : Drain
B : Base C : Collector E : Emitter

Ordering Information

Device	Package	Shipping
KWMBNN01	SOT-363 (Pb-free lead plating and halogen-free package)	3000 pcs / Tape & Reel

Absolute Maximum Ratings (T_A=25°C)

NMOS

Parameter	Symbol	Limits	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	
Continuous Drain Current @ V_{GS}=4.5V, T_A=25°C	I_D	200	mA
Continuous Drain Current @ V_{GS}=4.5V, T_A=70°C		160	
Pulsed Drain Current *a	I_{DM}	800	
Continuous Body Diode Forward Current @ T_A=25°C	I_S	200	
ESD susceptibility *b	V_{ESD}	2000	V
Operating Junction and Storage Temperature Range	T_J, T_{stg}	-55~+150	°C

NPN

Parameter	Symbol	Limits	Unit
Collector-Base Voltage	V_{CBO}	60	V
Collector-Emitter Voltage	V_{CEO}	50	
Emitter-Base Voltage	V_{EBO}	7	
Collector Current	I_C	200	mA
Operating Junction Temperature Range	Tj	-55~+150	°C
Storage Temperature Range	Tstg	-55~+150	

Thermal Data

Parameter	Symbol	Steady State	Unit
Total Power Dissipation	P_D	250	mW
Thermal Resistance, Junction-to-ambient	$R_{\theta JA}$	500	°C/W

Note:
*a. Repetitive rating, pulse width limited by junction temperature $T_{J(MAX)}$=150℃. Ratings are based on low frequency and low duty cycles to keep initial T_J=25℃.
*b. Human body model, 1.5kΩ in series with 100pF.

N-Channel MOSFET Electrical Characteristics (T_A=25°C, unless otherwise specified)

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Static					
BV_{DSS}	60	-	-	V	V_{GS}=0V, I_D=250μA
$V_{GS(th)}$	0.5	-	1.5		V_{DS}=V_{GS}, I_D=250μA
G_{FS}	-	0.5	-	S	V_{DS}=5V, I_D=200mA
I_{GSS}	-	-	±10	μA	V_{GS}=±16V, V_{DS}=0V
I_{DSS}	-	-	1		V_{DS}=48V, V_{GS}=0V
$R_{DS(ON)}$	-	1.3	3	Ω	V_{GS}=4.5V, I_D=200mA
	-	1.7	5		V_{GS}=2.5V, I_D=100mA
Dynamic					
Ciss	-	25	-	pF	V_{DS}=30V, V_{GS}=0V, f=1MHz
Coss	-	8	-		
Crss	-	7	-		
Qg *1, 2	-	0.75	-	nC	V_{DS}=30V, I_D=200mA, V_{GS}=4.5V
Qgs *1, 2	-	0.35	-		
Qgd *1, 2	-	0.15	-		
$t_{d(ON)}$ *1, 2	-	3	-	ns	V_{DS}=30V, I_D=200mA, V_{GS}=4.5V, R_{GS}=25Ω
tr *1, 2	-	16	-		
$t_{d(OFF)}$ *1, 2	-	11	-		
t_f *1, 2	-	16	-		
Source-Drain Diode					
V_{SD} *1	-	0.8	1.2	V	I_S=200mA, V_{GS}=0V
trr	-	9	-	ns	I_F=200mA, dI_F/dt=100A/μs
Qrr	-	2.7	-	nC	

Note:

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

*2. Independent of operating temperature

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

Symbol	Min.	Typ.	Max.	Unit	Test Conditions
BV_{CBO}	60	-	-	V	I_C=100μA
BV_{CEO}	50	-	-		I_C=1mA
BV_{EBO}	7	-	-		I_E=50μA
I_{CBO}	-	-	100	nA	V_{CB}=60V
I_{EBO}	-	-	100		V_{EB}=7V
*$V_{CE(sat)}$	-	-	100	mV	I_C=10mA, I_B=500μA
*$V_{CE(sat)}$	-	-	300		I_C=100mA, I_B=5mA
*$V_{BE(sat)}$	-	-	800		I_C=10mA, I_B=500μA
*$V_{BE(sat)}$	-	-	1000		I_C=100mA, I_B=5mA
*$V_{BE(ON)}$	580	-	700		V_{CE}=5V, I_C=2mA
*$V_{BE(ON)}$	-	-	770		V_{CE}=5V, I_C=10mA
*h_{FE}	200	-	450		V_{CE}=5V, I_C=2mA
f_T	80	180	-	MHz	V_{CE}=12V, I_C=2mA, f=100MHz
Cob	-	2	3.5	pF	V_{CB}=12V, f=1MHz

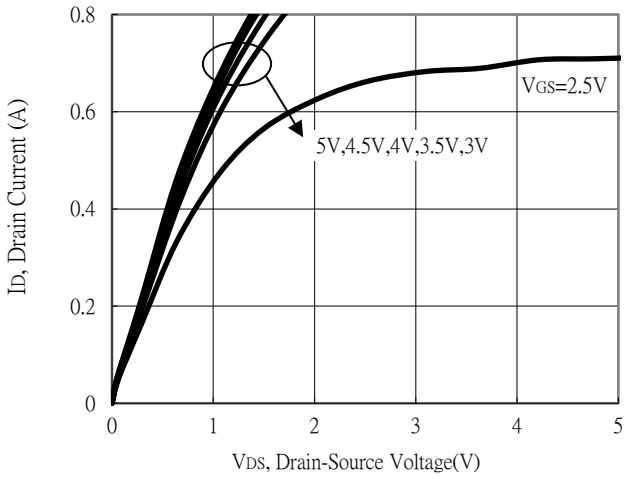
Note:

*1. Pulse Test : Pulse Width ≤380μs, Duty Cycle≤2%

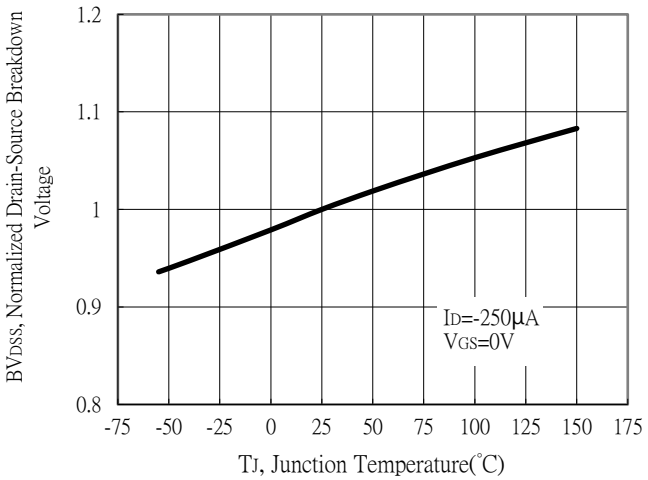
*2. Independent of operating temperature

Typical Characteristics : NMOS

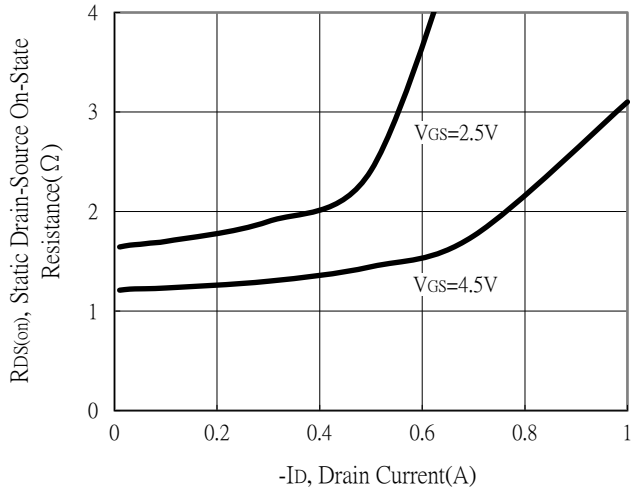
Typical Output Characteristics



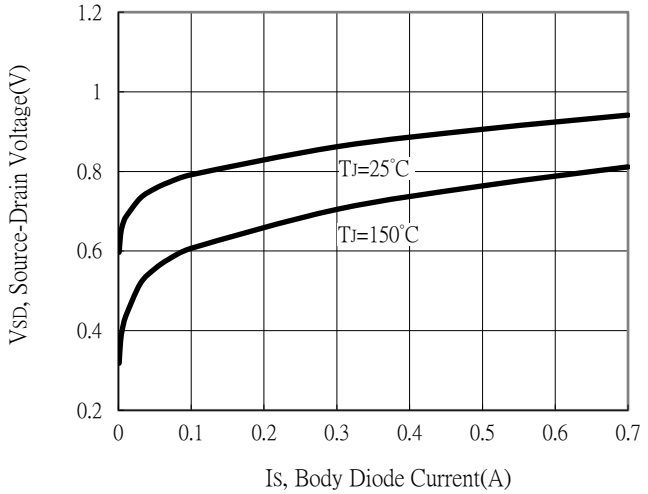
Breakdown Voltage vs Junction Temperature



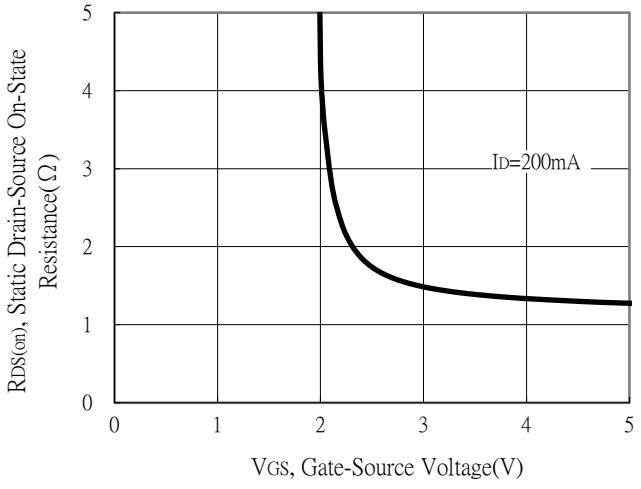
Static Drain-Source On-State resistance vs Drain Current



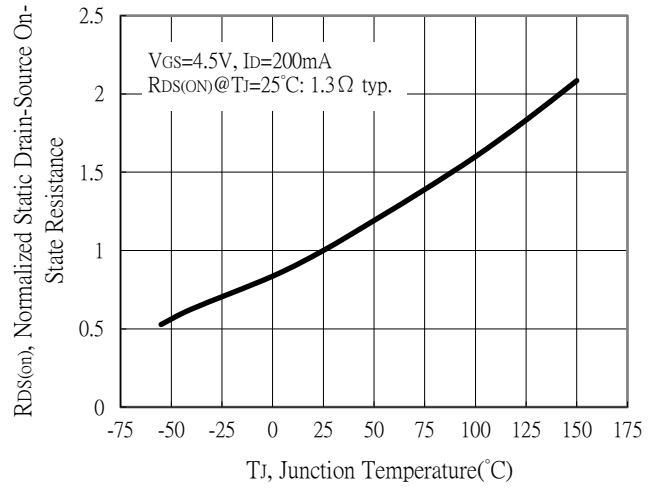
Body Diode Current vs Source-Drain Voltage



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

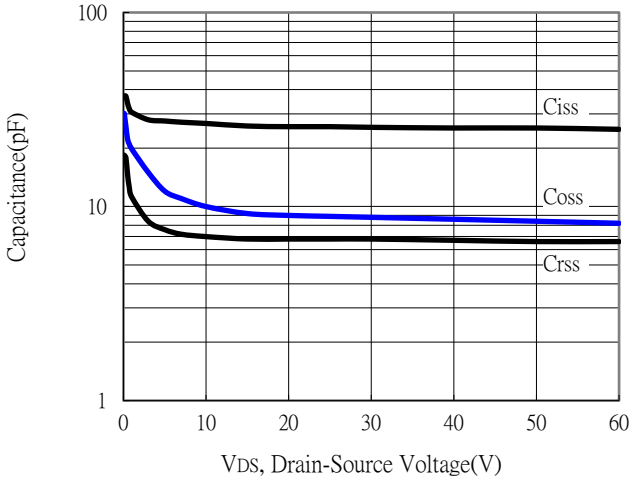


Drain-Source On-State Resistance vs Junction Temperature

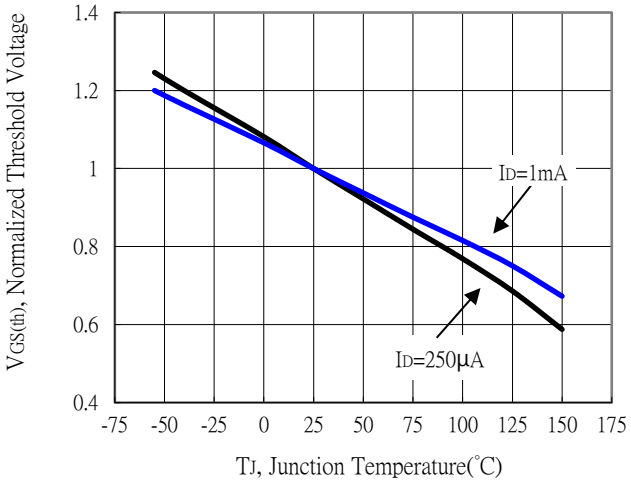


Typical Characteristics : NMOS (Cont.)

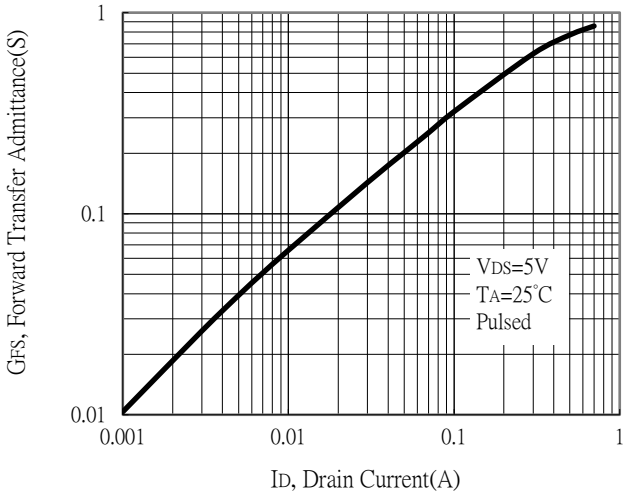
Capacitance vs Drain-to-Source Voltage



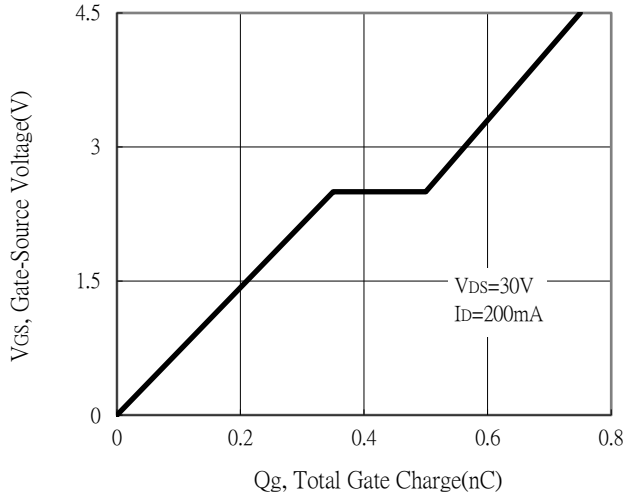
Threshold Voltage vs Junction Temperature



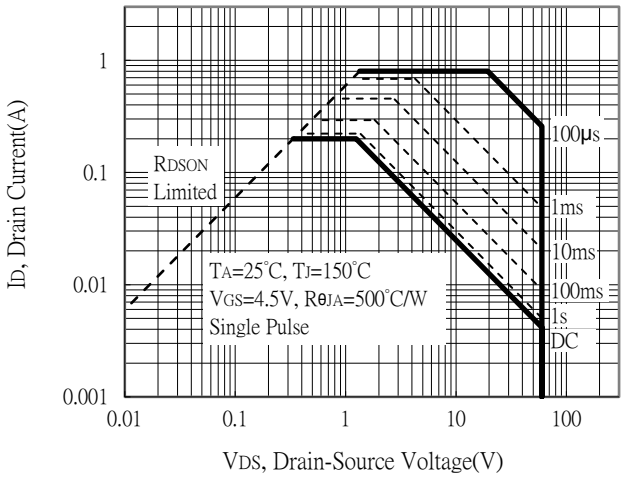
Forward Transfer Admittance vs Drain Current



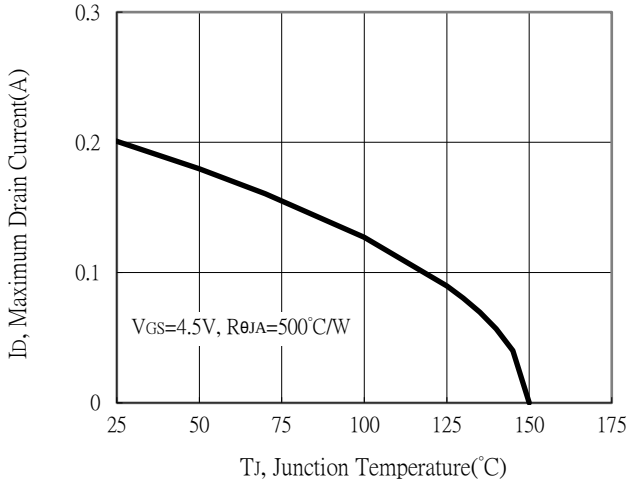
Gate Charge Characteristics



Maximum Safe Operating Area

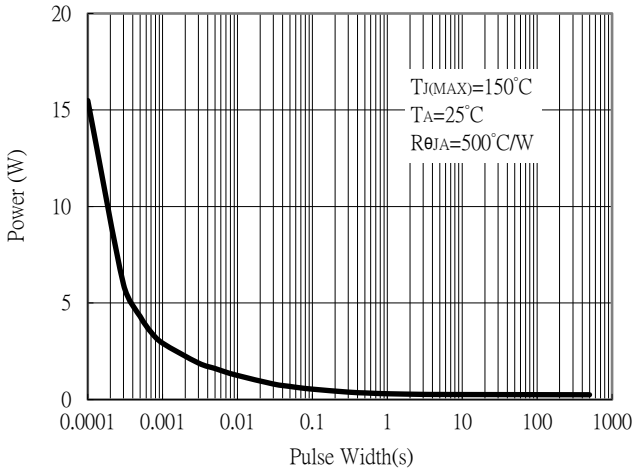


Maximum Drain Current vs Junction Temperature

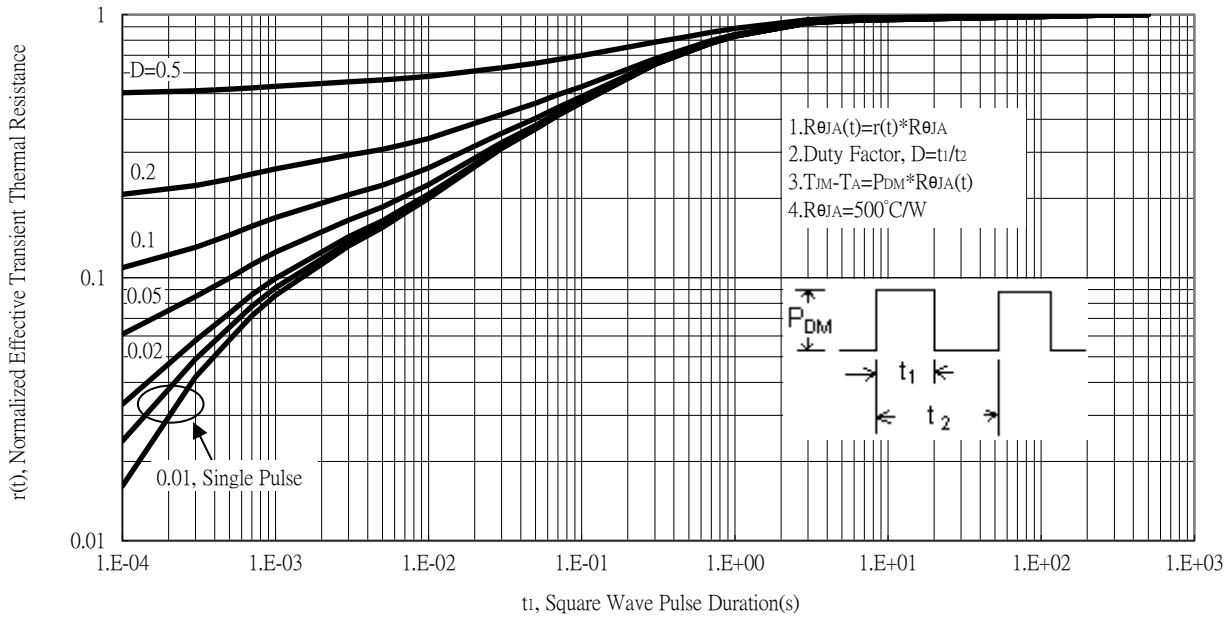


Typical Characteristics : NMOS (Cont.)

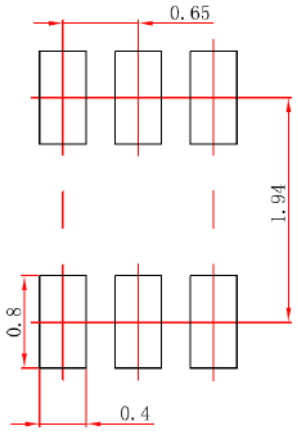
Single Pulse Power Rating, Junction to Ambient



Transient Thermal Response Curves



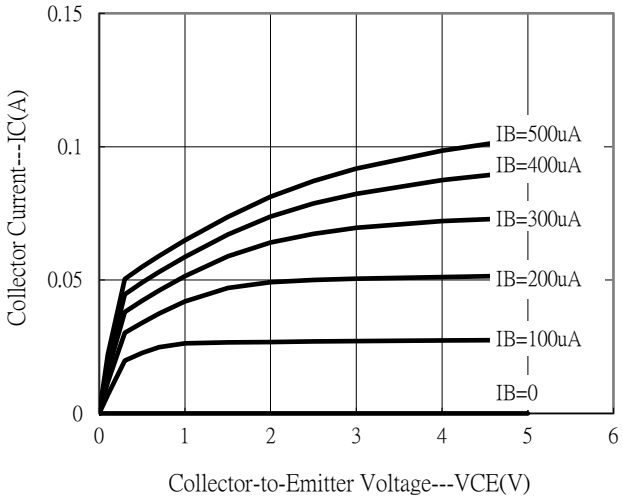
Recommended Soldering Footprint



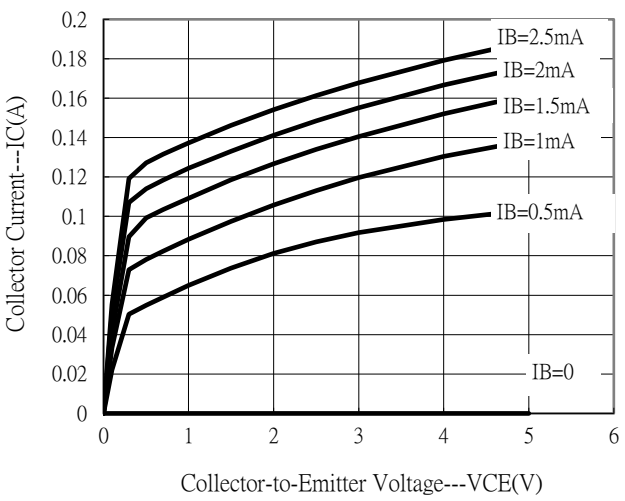
Unit : mm

Typical Characteristics : NPN

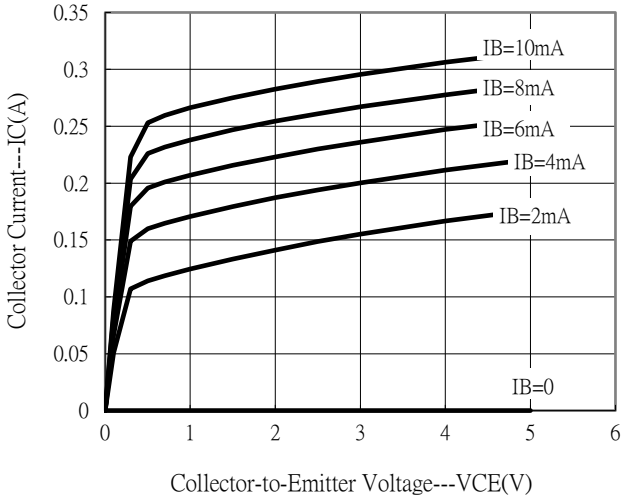
Output Characteristics



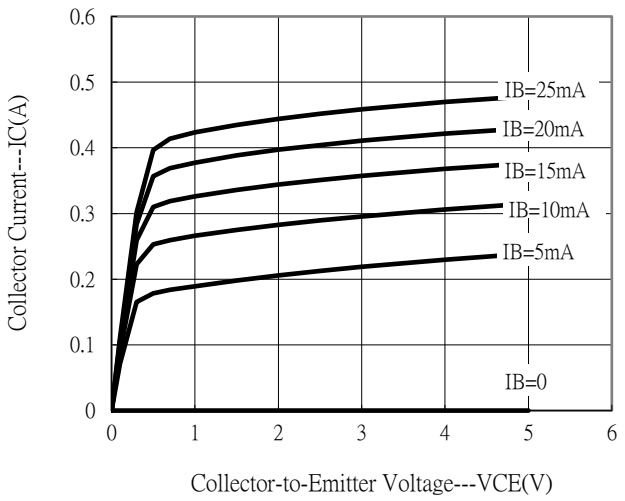
Output Characteristics



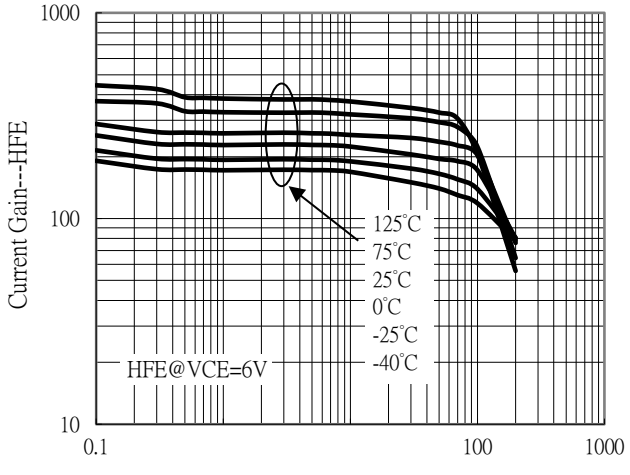
Output Characteristics



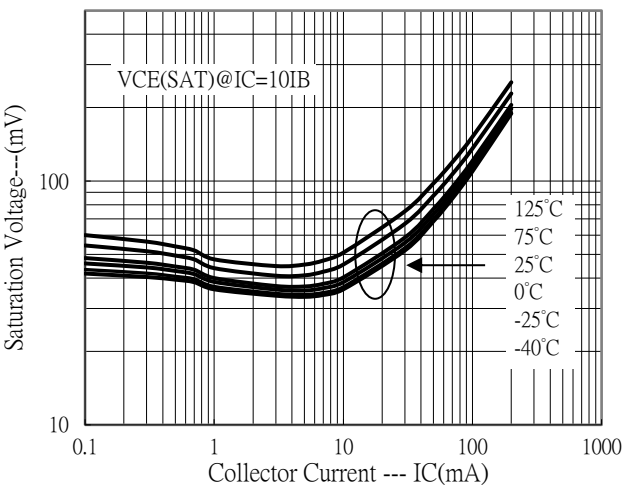
Output Characteristics



Current Gain vs Collector Current

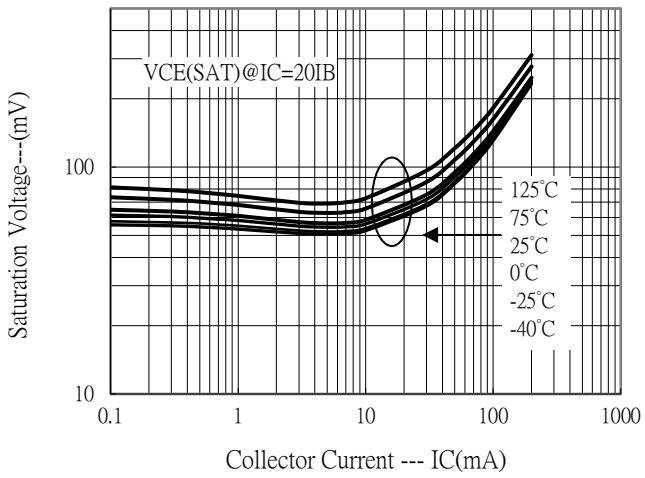


Saturation Voltage vs Collector Current

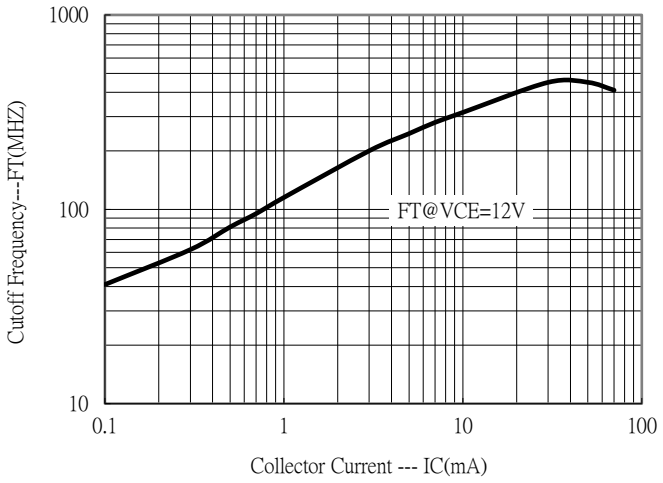


Typical Characteristics : NPN (Cont.)

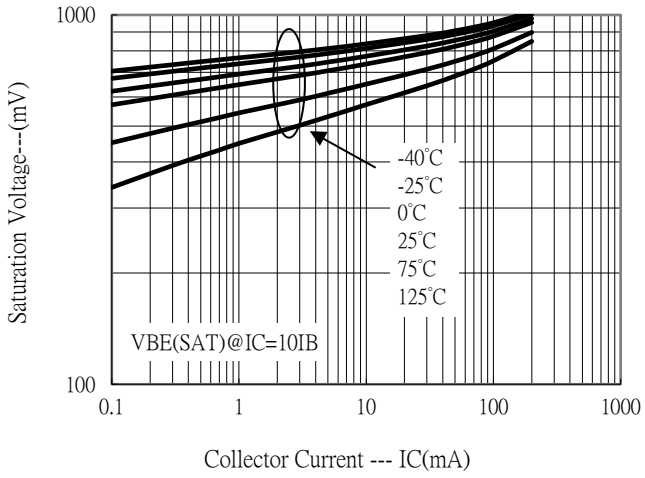
Saturation Voltage vs Collector Current



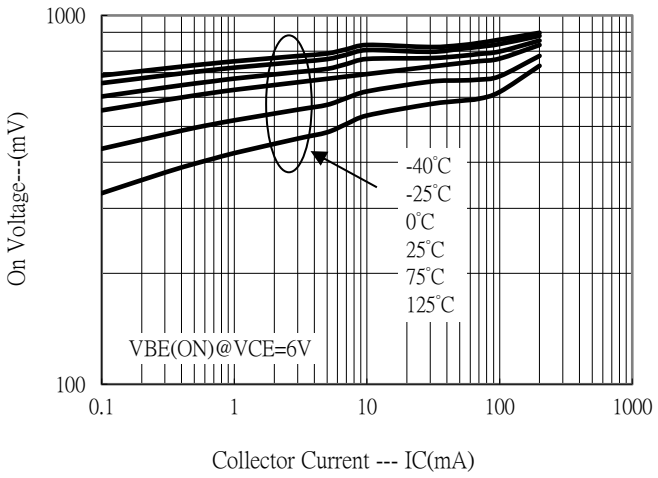
Cutoff Frequency vs Collector Current



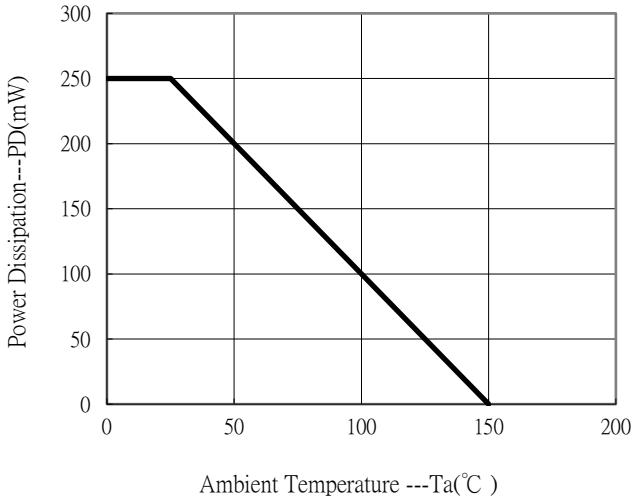
Saturation Voltage vs Collector Current



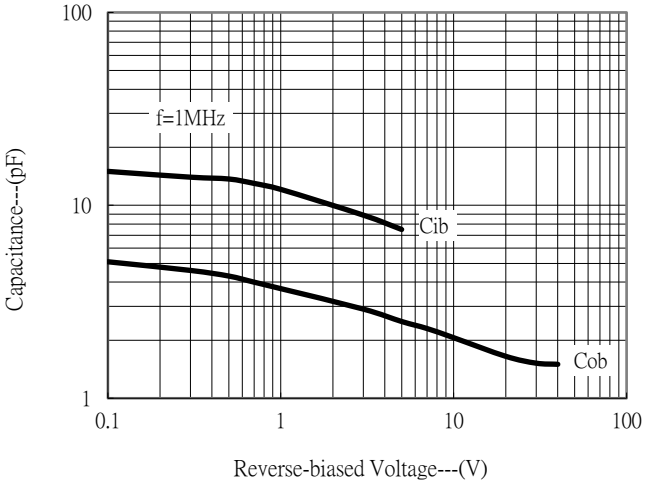
On Voltage vs Collector Current



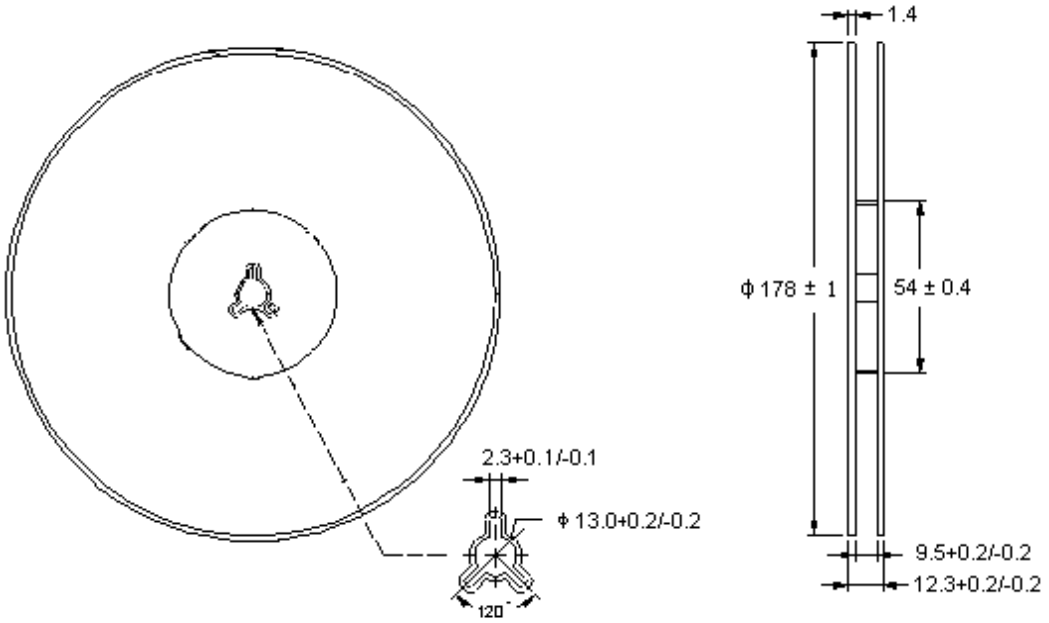
Power Derating Curve



Capacitance Characteristics

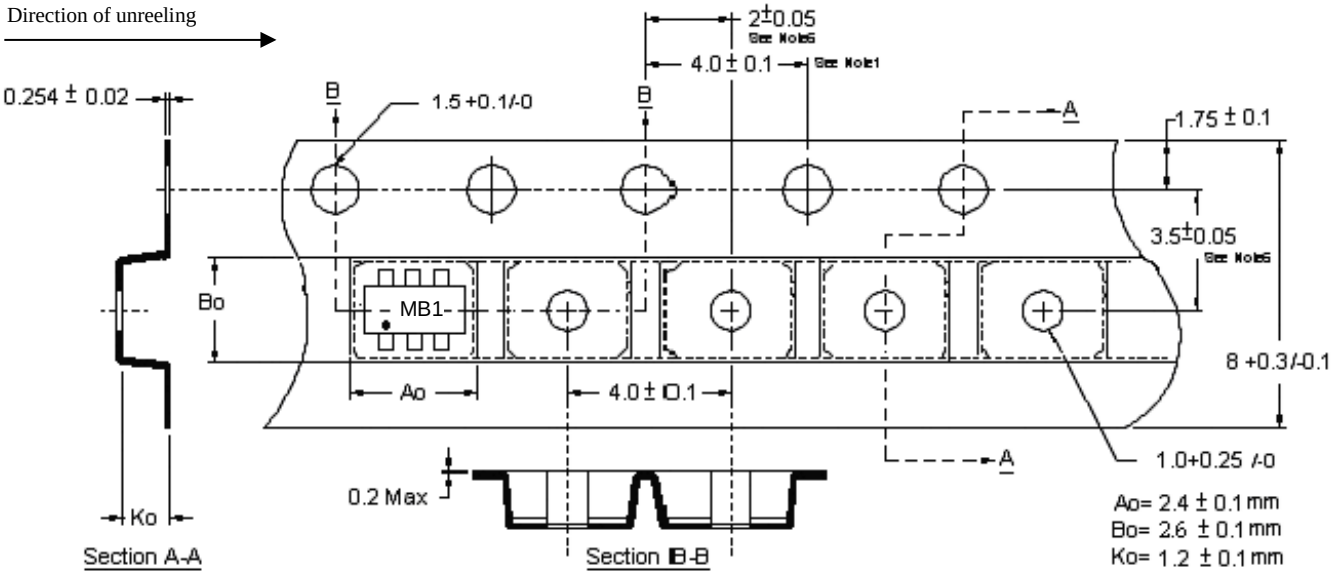


Reel Dimension



Unit: millimeter

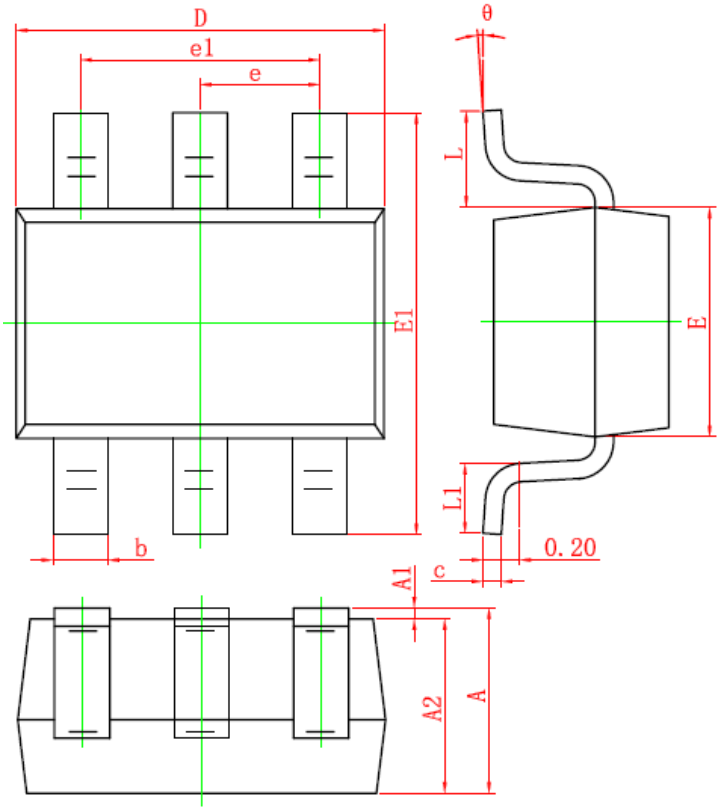
Carrier Tape Dimension



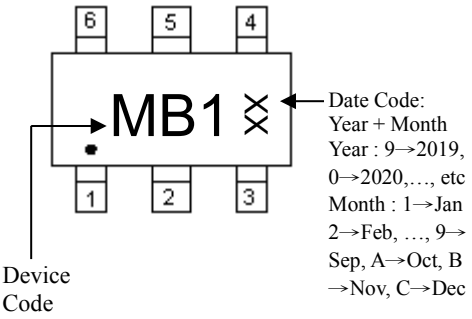
Notes:
1. 10 sprocket hole pitch cumulative tolerace ±0.2.
2. Camber not to exceed 1mm in 100mm.
3. Material: Conductive Black Polystyrene.
4. Ao & Bo measured on a plane 0.3mm above the bottom of the pocket.
5. Ko measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
6. Pocket position relative to sprocket hole measured as true position of pocket, not pocket hole.

Unit : millimeter

SOT-363 Dimension



Marking:



6-Lead SOT-363 Plastic
Surface Mounted Package

Style:
Pin 1. Source (S)
Pin 2. Gate (G)
Pin 3. Collector (C)
Pin 4. Emitter (E)
Pin 5. Base (B)
Pin 6. Drain (D)

DIM	Millimeters		Inches		DIM	Millimeters		Inches	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.900	1.100	0.035	0.043	E1	2.150	2.450	0.085	0.096
A1	0.000	0.100	0.000	0.004	e	0.650	TYP	0.026	TYP
A2	0.900	1.000	0.035	0.039	e1	1.200	1.400	0.047	0.055
b	0.150	0.350	0.006	0.014	L	0.525	REF	0.021	REF
c	0.080	0.150	0.003	0.006	L1	0.260	0.460	0.010	0.018
D	2.000	2.200	0.079	0.087	θ	0°	8°	0°	8°
E	1.150	1.350	0.045	0.053					