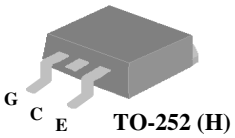
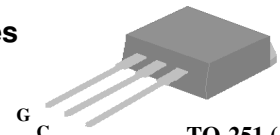
Insulated Gate Bipolar Power Transistor

High Input Impedance
High Peak Current Capability
Low Gate Drive
Strobe Flash Applications
RoHS-compliant, halogen-free packages

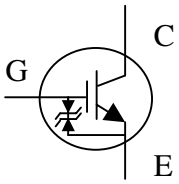


TO-252 (H)



TO-251 (J)

V_{CE}	400V
I_{CP}	150A



Absolute Maximum Ratings

Symbol	Parameter	Rating	Units
V_{CE}	Collector-Emitter Voltage	400	V
V_{GEP}	Peak Gate-Emitter Voltage	± 6	V
I_{CP}	Pulsed Collector Current, V_{GE} = 2.5V	150	A
P_D at T_A=25℃	Maximum Power Dissipation	1.1	W
T_{STG}	Storage Temperature Range	-55 to 150	°C
T_J	Operating Junction Temperature Range	150	°C

Electrical Specifications at T_j=25℃ (unless otherwise specified)

Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Units
I_{GES}	Gate-Emitter Leakage Current	V_{GE}=± 6V, V_{CE}=0V	-	-	±10	uA
I_{CES}	Collector-Emitter Leakage Current	V_{CE}=400V, V_{GE}=0V	-	-	10	uA
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	V_{GE}=2.5V, I_{CP}=150A (Pulsed)	-	3.5	8	V
$V_{GE(th)}$	Gate Threshold Voltage	V_{CE}=V_{GE}, I_C=250uA	0.3	-	1.2	V
Q_g	Total Gate Charge	I_C=40A	-	76	130	nC
Q_{ge}	Gate-Emitter Charge	V_{CE}=200V	-	4	-	nC
Q_{gc}	Gate-Collector Charge	V_{GE}=4V	-	26	-	nC
$t_{d(on)}$	Turn-on Delay Time	V_{CC}=320V	-	220	-	ns
t_r	Rise Time	I_C=160A	-	800	-	ns
$t_{d(off)}$	Turn-off Delay Time	R_G=10Ω	-	1.6	-	μs
t_f	Fall Time	V_{GE}=4V	-	1.5	-	μs
C_{ies}	Input Capacitance	V_{GE}=0V	-	4485	8240	pF
C_{oes}	Output Capacitance	V_{CE}=30V	-	44	-	pF
C_{res}	Reverse Transfer Capacitance	f=1.0MHz	-	40	-	pF
Rth_{JC}	Thermal Resistance Junction-Case		-	-	2	°C/W
Rth_{JA}	Thermal Resistance Junction-Ambient		-	-	110	°C/W

Ordering Information

AP28G40GEH-HF-3TR	**RoHS-compliant halogen-free TO-252 shipped on tape and reel (3000 pcs/reel)**
AP28G40GEJ-HF-3TB	**RoHS-compliant halogen-free TO-251 shipped in tubes (80pcs/tube)**

Typical Electrical Characteristics

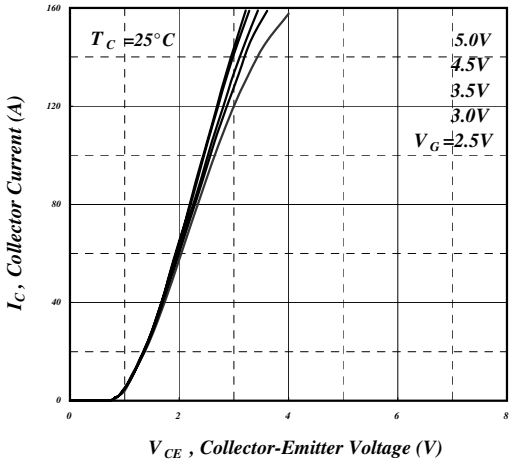


Fig 1. Typical Output Characteristics

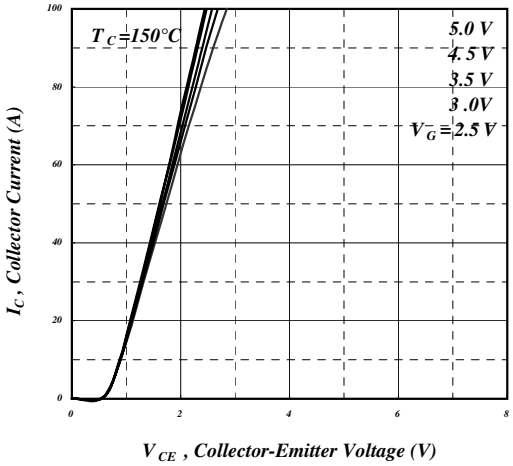


Fig 2. Typical Output Characteristics

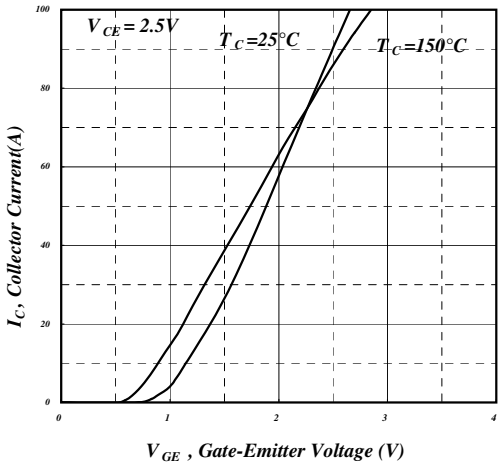


Fig 3. Collector Current vs. Gate-Emitter Voltage

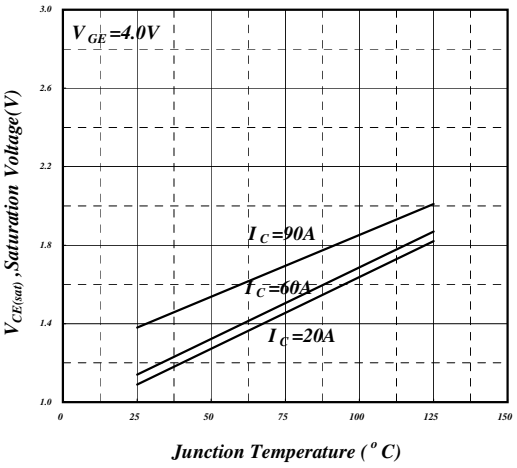


Fig 4. Collector- Emitter Saturation Voltage vs. Junction Temperature

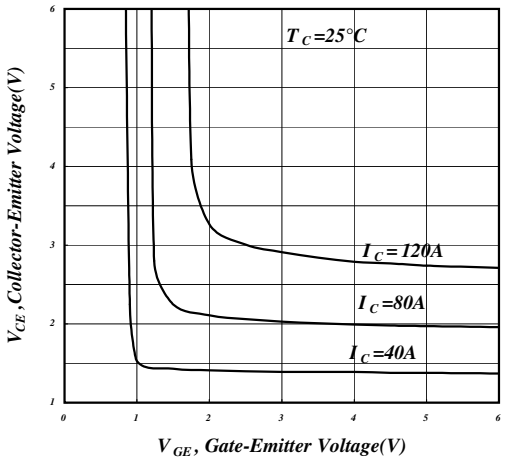


Fig 5. Collector Current vs. Gate-Emitter Voltage

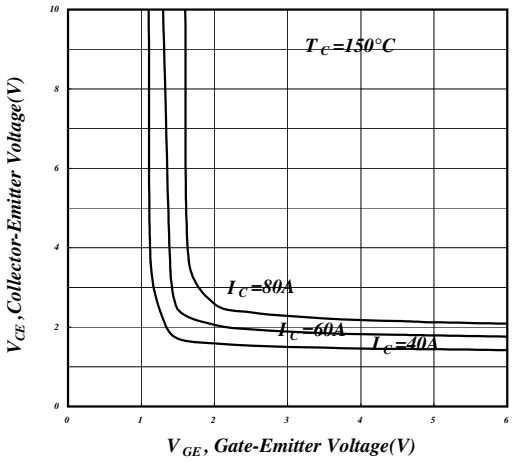


Fig 6. Collector Current vs. Gate-Emitter Voltage

Typical Electrical Characteristics (cont.)

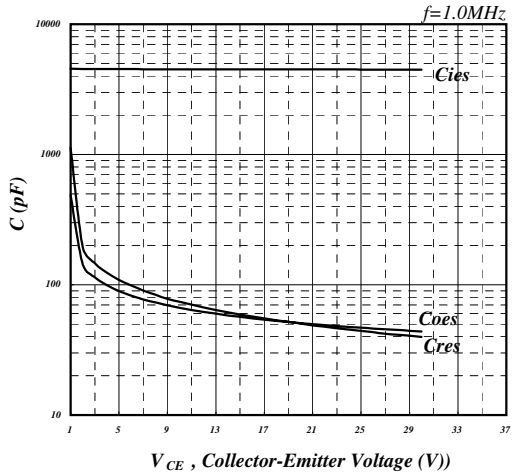


Fig 7. Typical Capacitance Characteristics

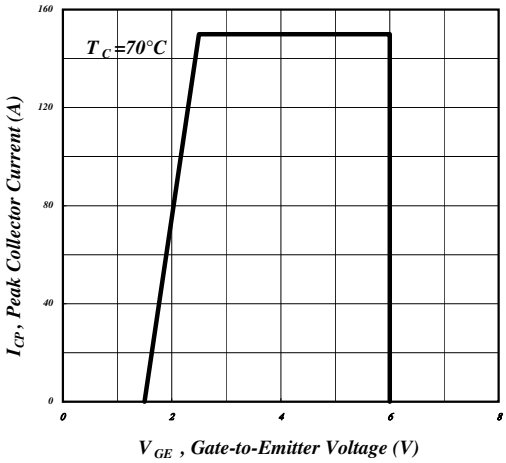


Fig 8. Maximum Pulse Collector Current

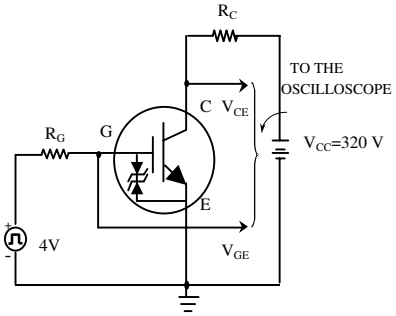


Fig 9. Switching Time Test Circuit

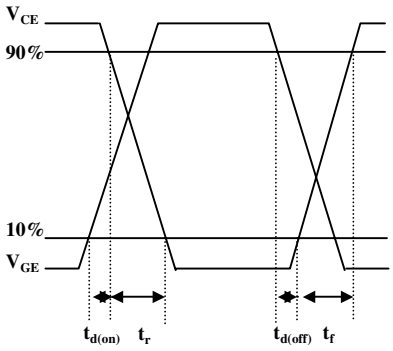


Fig 10. Switching Time Waveform

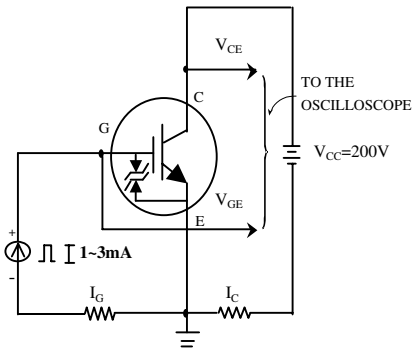


Fig 11. Gate Charge Test Circuit

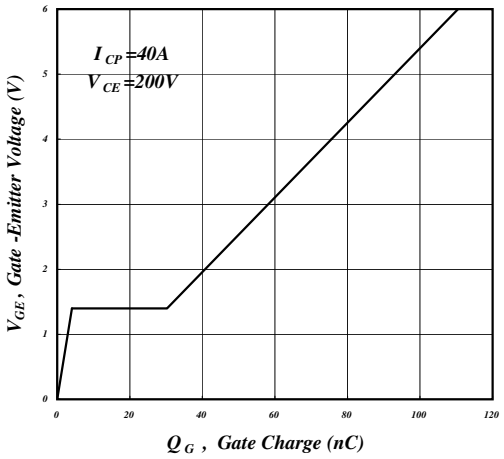


Fig 12. Gate Charge Waveform

Design Notice - dV/dt

You should design to keep the value of dV/dt below 400V/us, R_G=30Ω when the IGBT turns off.

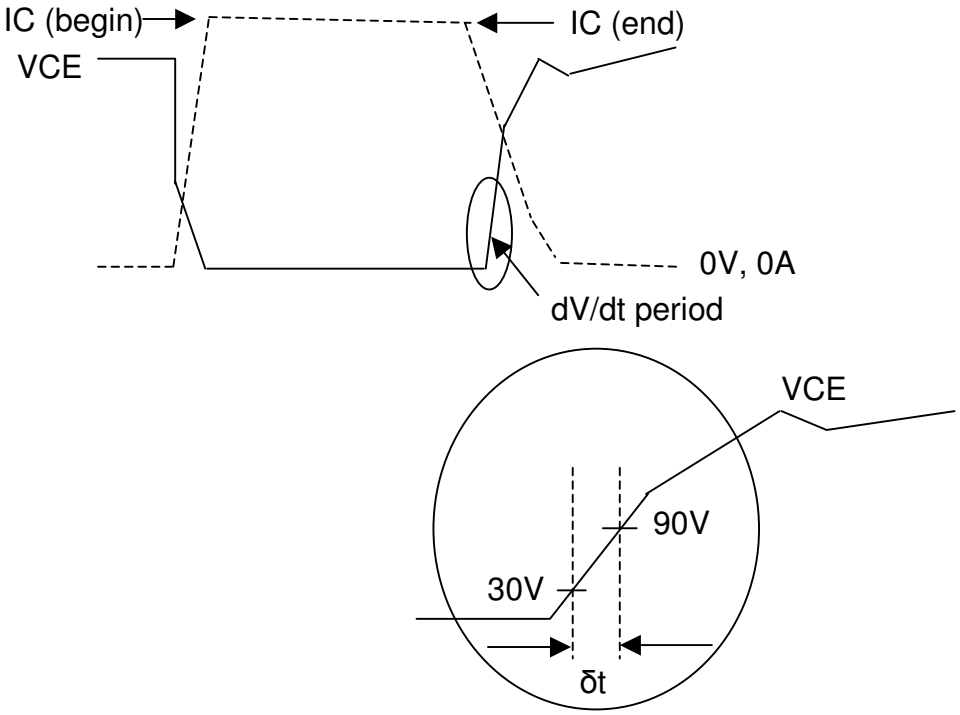
- Definition of dV/dt

  The slope of VCE from 30V to 90V

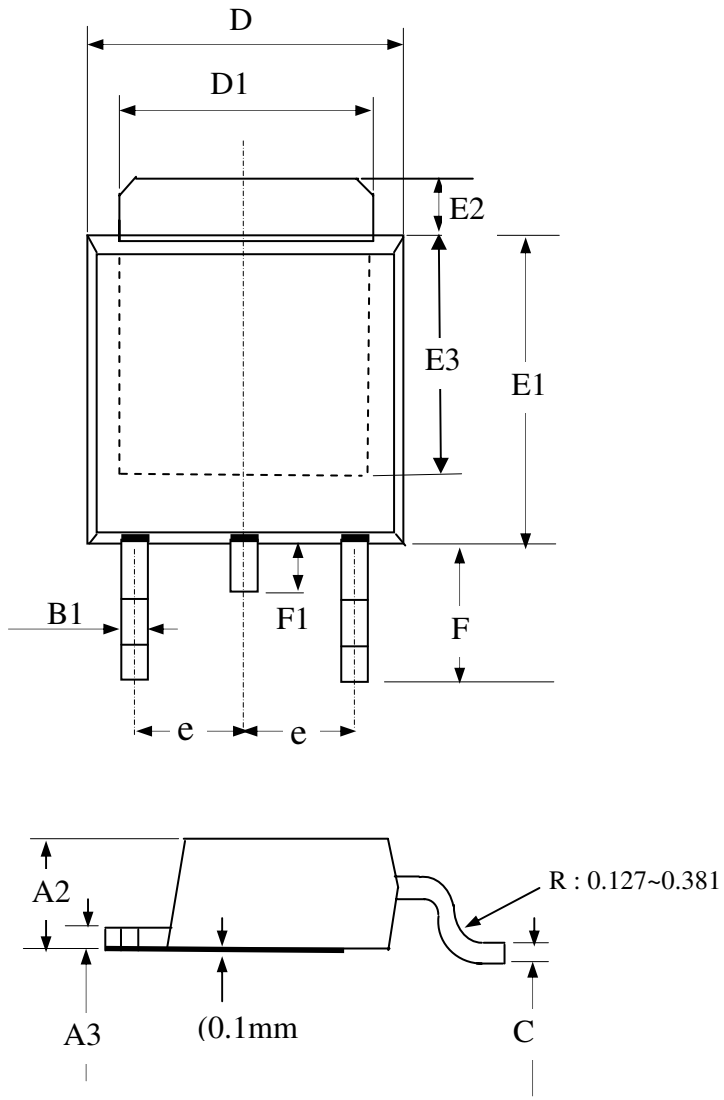
  dv/dt = (90V-30V) / δt)

  = 60V / δt

- Waveform



Package Dimensions: TO-252

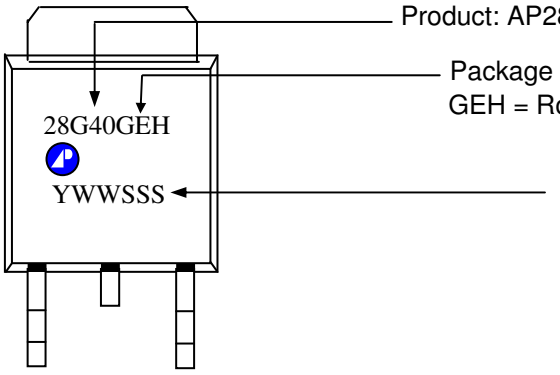


SYMBOLS	Millimeters		
	MIN	NOM	MAX
A2	1.80	2.30	2.80
A3	0.40	0.50	0.60
B1	0.40	0.70	1.00
D	6.00	6.50	7.00
D1	4.80	5.35	5.90
E3	3.50	4.00	4.50
F	2.20	2.63	3.05
F1	0.50	0.85	1.20
E1	5.10	5.70	6.30
E2	0.50	1.10	1.80
e	--	2.30	--
C	0.35	0.50	0.65

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-252

Laser Marking

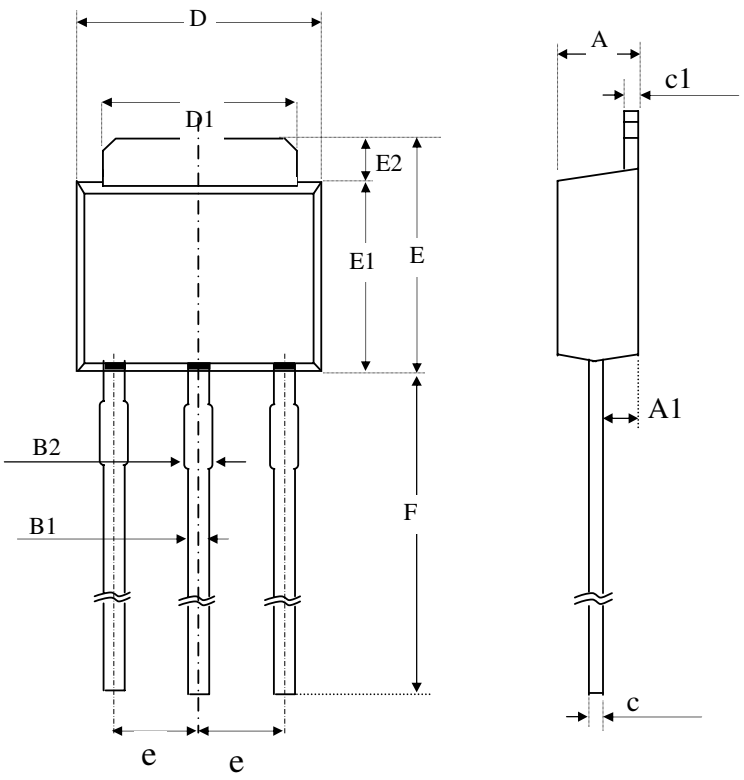


Product: AP28G40

Package code:
GEH = RoHS-compliant halogen-free TO-252 with ESD diode

Date/lot code (YWWSSS)
Y: Last digit of the year
WW: Work week
SSS: Lot code sequence

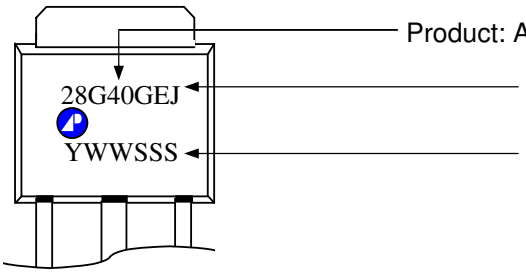
Package Dimensions: TO-251



SYMBOLS	Millimeters		
	MIN	NOM	MAX
A	2.20	2.30	2.40
A1	0.90	1.20	1.50
B1	0.40	0.60	0.80
B2	0.60	0.85	1.05
c	0.40	0.50	0.60
c1	0.40	0.50	0.60
D	6.40	6.60	6.80
D1	4.80	5.20	5.50
E	6.70	7.00	7.30
E1	5.40	5.60	5.80
E2	1.30	1.50	1.70
e	----	2.30	----
F	7.00	8.30	9.60

1. All dimensions are in millimeters.
2. Dimensions do not include mold protrusions.

Marking Information: TO-251



Product: AP28G40

Package Code:
GEJ = RoHS-compliant halogen-free TO-251 with ESD diode

Date Code (YWWSSS)
Y : Last digit of the year
WW : Work week
SSS : Lot code sequence